ELECTRICAL WEST

THE ALL-INDUSTRY MAGAZINE OF PROGRESS

AUG 20 1943

McGraw-Hill Co. of California

AUGUST, 1943

25c a Copy

THIS IS slow LIGHT
THIS IS fast LIGHT
How much Light does it take to win a war?
ARE YOUR EMPLOYEES WORKING BY SLOW LIGHT OR fast LIGHT?
It takes 50 Footcandles to win the Battle of Production in World War II
In this War you can't make guns by candlelight

More Edison ammunition for the battle of production!

The Edison Company is proud of the part its adequate supply of low cost electric power is playing in the battle of production.

As an added service to its Southern California war plant customers, who are being called upon to perform daily miracles of production, Edison has distributed folders showing how high-speed precision output can be increased through improved lighting. These folders clearly illustrate why the lighting of World War I is totally inadequate for this war, and how improved lighting increases accuracy, saves workers' time, cuts down waste, accidents and fatigue.

The folders also invite war plants to avail themselves of the services of an Edison lighting advisor familiar with the latest developments in war plant lighting, for a no-cost checkup and report on their plant's lighting.

Waste in war is a crime . . . do not waste electricity just because it is not rationed

843

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

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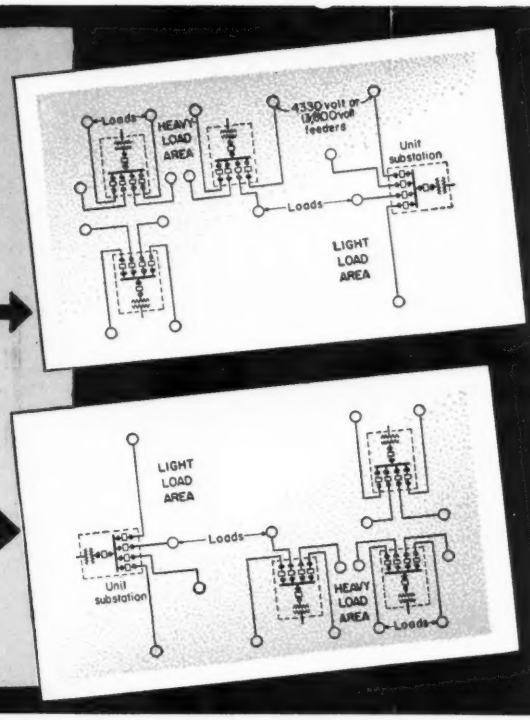
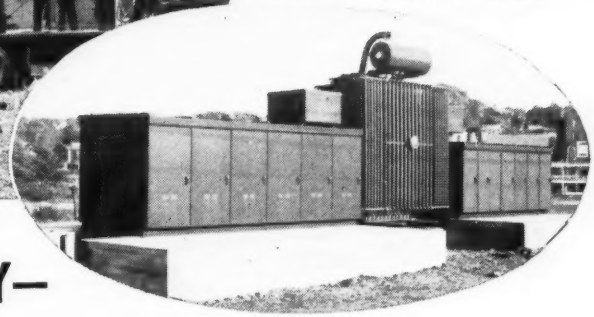
TO SUPPLY
QUICKLY NEW LOADS →
---THAT ARE LIKELY
TO SHIFT →



Install UNIT SUBSTATIONS

Even large unit substations like this (3000 kva) are shipped in completely assembled sections. Skid them into position, bolt them together, make the necessary connections—and the unit substation is ready for service.



YOU CAN INSTALL THEM QUICKLY—
AND MOVE THEM EASILY IF THE LOAD SHIFTS

YOU can order and install G-E unit substations in a fraction of the time required for old-style, "piecemeal" substations. They are delivered in compact, completely assembled sections. By locating them right at load centers, you shorten secondary runs, save vital copper, and reduce losses.

What's more, if the load shifts, the easy-to-handle sections make it easy to move a unit substation to the new load center, whether it be yards or miles away.

Installed, a unit substation is a single, coordinated, safety-enclosed unit that functions more dependably and gives extra protection to personnel. Designed for outdoor service—and with a pleasing appearance—they make large investments in real estate and buildings unnecessary.

From every angle, *unit* substations are the practical, far-sighted answer to the changing power requirements of today and tomorrow. A new, attractive 36-page bulletin contains complete, useful information. You can get a copy from your local G-E office, or by writing General Electric Co., Schenectady, N. Y.

GENERAL ELECTRIC

302-15-5900

Here in the WEST

People

Austin Dunham

whose clear description of wire insulation substitutes was presented to three chapter meetings of the IAEI, (p. 60) is district manager of Anaconda Wire & Cable Co., at Denver, succeeding Ed Casey, who was made Western Division manager, in San Francisco. Dunham came from the New York office of Anaconda in 1938 as assistant to Casey in Denver, was made manager in 1939. He is an associate member of AIEE, Denver, and of the Western Section, IAEI. His paper reviews the various materials used for insulation, their availability, the metal situation and ways in which savings are being made. He presents the wire restrictions in a realistic fashion.

Orland Mayer

is commercial and industrial manager for Idaho Power. He tells of his company's work to keep its small industries going (p. 53) far from war centers.

G. L. Beaver

has been with General Electric Co. since he was graduated from Stanford University in 1915, except for a leave to serve with the armed forces during World War 1. He took the company test course at Schenectady; then worked in the general office, doing commercial work. In 1920, he was transferred to G-E's Chicago office and, in January 1922, he came to the West Coast. He is sales engineer in the industrial division. In this issue he writes (p. 43) of Columbia Steel Co.'s new mill at Pittsburg, Calif.

C. E. Baugh

is in the Pacific Gas and Electric engineering department, specializing on distribution. He tells how switch and fuses replace circuit breaker on 60-kv. sub (p. 43).

Pages

Free Competitive Enterprise 41
By Leonard E. Read—All must strive for the preservation of free competitive enterprise.

Steel Mill Sectionalizes Drive 43
By G. L. Beaver—Large single speed a-c motors and gears give way to d-c sectional drive with pulpit control in new California rod mill.

Put Small Business into War Production 52
What has been done in Washington and Idaho to help small local firms who have served civilian economy in the past and will again in the future but are suffering from today's concentration of production in huge factories.

Critical Materials in Wire and Cable 60
By Austin Dunham—What materials are scarce and why, what substitutes are being used, what the outlook for the future is in respect to wiring standards.

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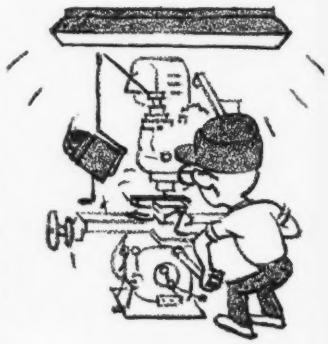
Cover photo: Draftsmen at Public Service Co. of Colorado

Preview

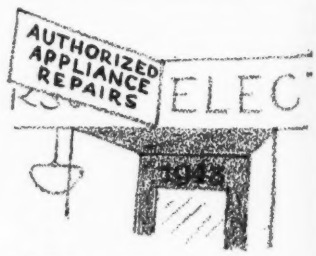
Lighting Issue



Although home and commercial lighting are under wraps in more ways than Barney Google's horse, war industry has recognized lighting as an aid to speeded production and decreased spoilage and accidents. Much remains to be done in many places producing war materiel, to be sure. Therefore the methods and ideas developed in those plants which have found such benefit should point the way to improvements that can aid the others. With the present so well under design control it is not improper to lift the eyes to the future and do some constructive thinking as to what may be done with illumination in the rebuilding of a war depreciated world. The September issue, laying stress upon lighting, as is customary, will present both these views—the close-up immediate wartime one and the distant perspective of a brighter, lighter future.

Service Stations

On the walls of dealer shops throughout the West may be seen a card reprint of a master list of authorized electric applience repair service stations published in 1938. Next month ELECTRICAL WEST will

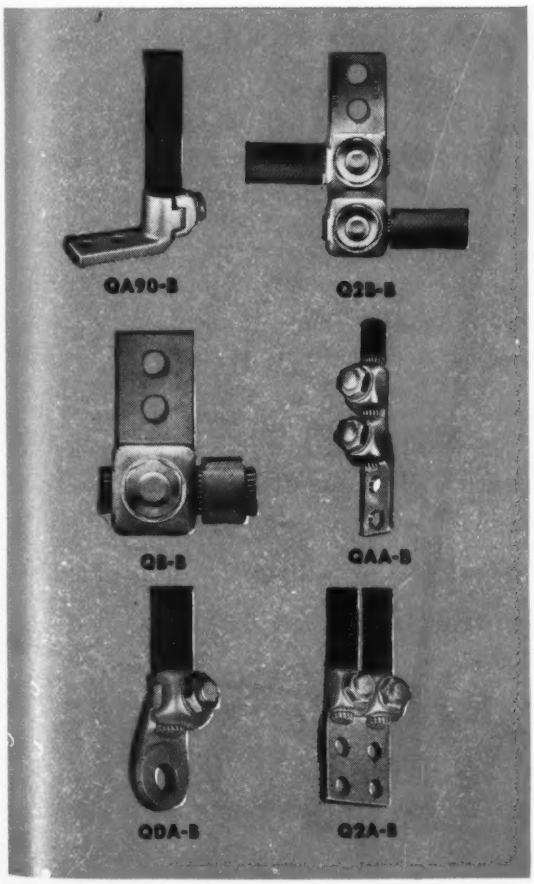


publish a revised and up-to-date list, adding the trade names and indicating availability of parts. Practional horsepower motors, water systems, air conditioning and oil burners will be added to the previous list. Radio set repair stations too will be listed. This list will be worth holding on to.

Hydro Plant

The engineering section will feature PG and E's Dutch Flat hydroelectric plant.

Burndy SCRULUGS and QIKLUGS



Both these favorites are *unit* assemblies. Thus cables can be inserted easier and quicker . . . and there are no extra parts to loosen or lose. This feature assures a *stronger*, more *efficient* connection, too. Both are furnished with tongues blank, or drilled as required.

The Scrulug provides extreme compactness, with high mechanical strength. Only 4 sizes are required to accommodate cables ranging from #4 to #200 . . . or from #14 to 4/0 strand.

The Qiklug also provides extreme compactness, and is equipped with an oversize stud to eliminate all danger of stripping or distortion when tightening. And only 11 sizes of the standard Qiklug are necessary for cables ranging from #3 to 2000 mcm. Also supplied in variations to meet all connector needs.

Catalog giving complete information on these and other time-saving, cost-cutting Burndy connectors gladly sent on request.

Headquarters for connectors

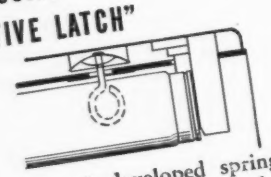
Burndy

BURNDY ENGINEERING CO., INC.

107 Eastern Boulevard • New York 54, N. Y.

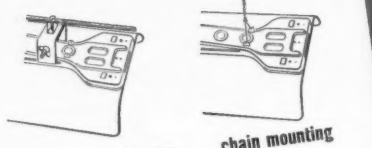
SYLVANIA *Challenger*

EXCLUSIVE "CAPTIVE LATCH"



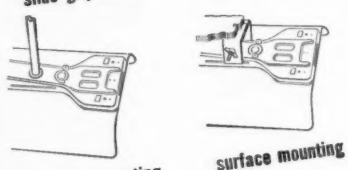
This Sylvania-developed spring-type fastener saves installation and maintenance man-hours. It stays put while lamp is in service despite any kind of vibration. It locks or unlocks with a simple quarter turn. No tools are necessary.

HANG IT ANY WAY YOU WANT



slide-grip hanger

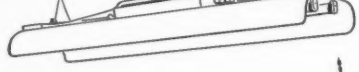
chain mounting



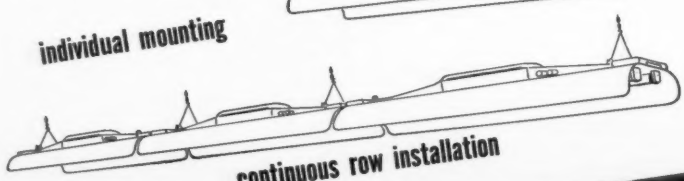
stem mounting

surface mounting

AND HOWEVER YOU WANT



individual mounting



continuous row installation

MORE LIGHT FROM LESS WEIGHT

Sylvania pioneered composition reflectors for fluorescent fixtures and "proved them in industry."

This composition reflector has an efficiency of 86 per cent — even higher than that of prewar porcelain-enameled metal in conventional contours.

It is fabricated to Sylvania's specifications from a strong and durable composition. Coated with MIRACOAT inside and a handsome French Gray outside, it stands up under extreme humidity and temperature conditions.

- √ Impervious to frequent washings.
- √ Gives more light.
- √ Lighter and easier to handle.

INCANDESCENT LAMPS, FLUORESCENT LAMPS, FIXTURE

Comparison

Check these points of Superiority

- √ Easier installation
- √ Speedier maintenance
- √ Cantilever construction
- √ Simple design
- √ Standard interchangeable parts
- √ Enclosed ballasts
- √ Single or continuous row hanging

The Fixture of the Future against the field

• Compare the design and construction of the Sylvania Fixture of the Future with any other fixture now available, and it wins hands down.

It is much more than a design to eliminate the metallic reflector and cut down top-housing weight to the three-pound requirement. Sylvania engineers attained a new standard of perfection, far ahead of its time.

A revelation of simplicity, this new Sylvania fixture is available in both 100-watt and 40-watt lamp size. In either length, *one* standard fixture fills any and all industrial lighting assignments.

Unparalleled in adaptability, it may be installed individually or in continuous rows. It is fitted with knock-outs for any practical mounting. The optional number of lamps in the regular 40-watt size gives new flexibility in meeting varying foot-candle requirements.

The streamlined top-housing, constructed like a cantilever bridge, encloses the ballast — protects it from dust — provides cooler performance. The starter sockets are honestly accessible — inset from the side to avoid dust, dirt and moisture. Pull-chain switch is optional.

The Sylvania Fixture of the Future carries Underwriters' Laboratories approval and our own standard guarantee. For specifications and prices, write Dept. ELW-8 Sylvania, Ipswich, Mass.

"Everything that's Finest in Fluorescent"

★ ★ **SYLVANIA ELECTRIC PRODUCTS INC.**

LIGHTING DIVISION, IPSWICH, MASS.

AND ACCESSORIES, RADIO TUBES, ELECTRONIC DEVICES

Aid in today's emergencies

KLEIN'S

Communication lines are jammed with vital messages —power lines are carrying greater loads than ever before. To keep lines working in the face of today's emergencies is the job that Public Utilities are ably performing.

The ability of Klein quality equipment to meet the demands of this unusual service is proving the foresight of those men who demanded the best when purchasing pliers and climbers, safety straps and belts, grips and wrenches.

Of necessity, Klein production today is largely devoted to supplying the needs of the Army and Navy. It is important therefore that every piece of equipment in civilian use be properly cared for to assure it's delivering the long life which is inherent in any product carrying the name KLEIN.

To aid in making tools last longer, give better service, Klein has prepared a booklet, "Long Life to Tools," a copy of which will be mailed to anyone interested.

This book on the care and safe use of tools will be sent without charge on request.

ASK YOUR SUPPLIER

Foreign Distributors: International Standard Electric Corp., New York

Mathias KLEIN & Sons
Established 1857 Chicago, Ill., U.S.A.
3200 BELMONT AVENUE, CHICAGO

BOOKS *you may want*

APPLIED ELECTRONICS, by members of the staff of the Department of Electrical Engineering, Massachusetts Institute of Technology, 794 pages, 6 x 9, 404 illustrations, John Wiley & Sons, $6.50. The purpose of this book is to provide a foundation, a basic course, for the study of electronics with emphasis being placed on logical reasoning and analysis rather than extensive applications. It is quite thorough, pointing out all links in a chain of reasoning in order to avoid those gaps, which may be taken for granted by the experienced engineer. that are so disturbing to a careful student. Scrupulous attention is given to such aids to clearness as precise definitions of symbols and their interpretation in terms and values of physical quantities, and to apparently minor details which are elementary but essential.

Since the proper application of electronic apparatus requires a working knowledge of the physical phenomena involved in the apparatus, the first part of this book is a discussion of these phenomena. The characteristics of the electron and its related elementary particles are carefully covered as is their behavior under the influence of electrostatic and electromagnetic fields. Electronic emission and conduction are thoroughly analyzed.

The second part is an explanation of the way the phenomena combine and govern the characteristics, ratings, limitations of electronic devices, such as, diodes, triodes, pentodes, beam power tubes, ignitrons, thyratrons, etc.

The remainder is a treatment of applications common to the several branches of electrical engineering. Included here are rectifier circuits, all classes of amplifiers, oscillators, modulators, detectors, etc. Their characteristics and the engineering design data developed is logically approached and thoroughly discussed. A good mathematical background is required for a complete understanding of this book; however, the use of advanced mathematics has been omitted as much as possible.—J. S. K.

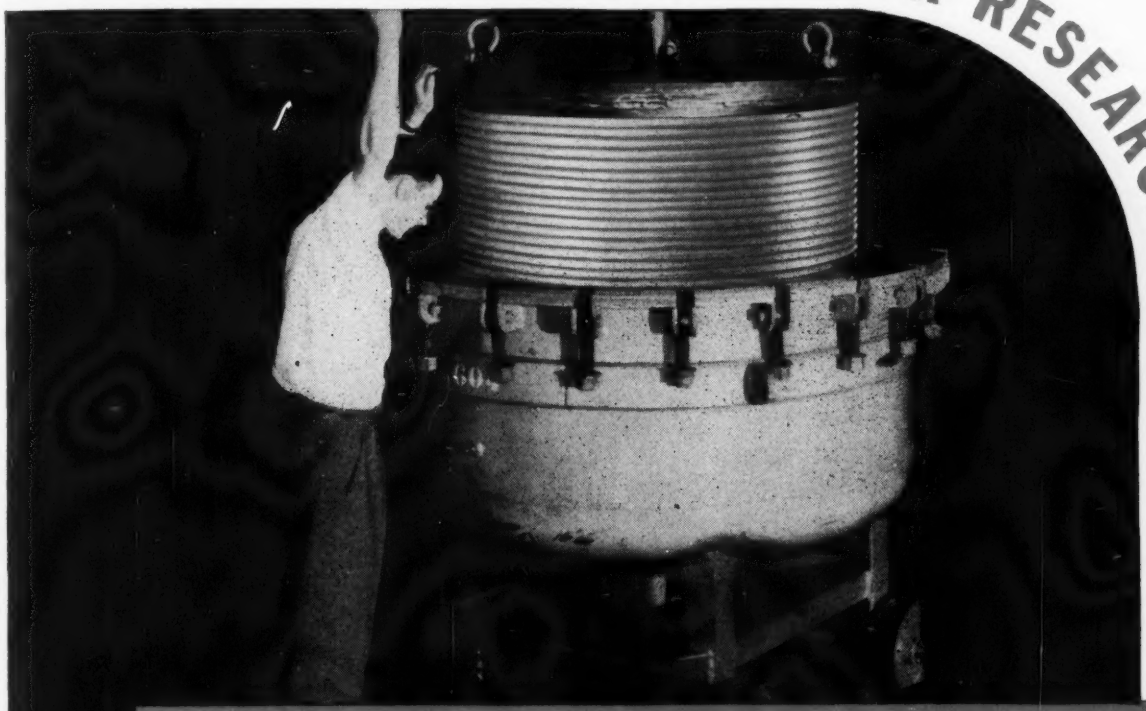
●

FOREMANSHIP AND SAFETY, by C. M. MacMillan, 7½ x 5¼, paper spiral binding, 101 pages, 23 illustrations, John Wiley & Sons, $1. The author of this manual addresses his remarks to the plant foreman on the theory that a foreman, if properly trained, is in the best position to reduce accidents.

Each of the 27 chapters is concise and written in simple language; each discusses a single problem with suggestions for the foreman and a prepared talk which he may deliver to workers under him.

The author believes that no sane person courts injury and, if properly approached, will welcome advice which insures his safety; therefore, considerable space is devoted to methods of approach. The foreman is given suggestions for winning the respect and loyalty of his men; securing cooperation without encouraging a "spy" system; avoiding a feeling of resentment on the part of the men, particularly with reference to accidents likely to occur outside working hours. He is told how to prepare and enforce safety rules; how to figure severity and frequency rates and hidden costs of accidents.

THROUGH OKONITE-CALLENDER RESEARCH



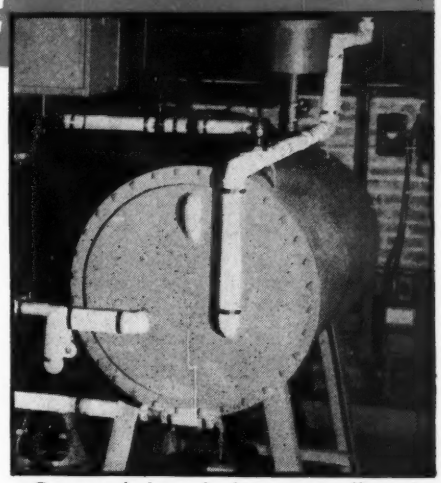
A PILOT PLANT GUIDES US ON THE PROPER COURSE

In Okonite-Callender's Research Laboratory there is a pilot plant. Here a complete manhole-length of experimental cable up to 2-inches in diameter, incorporating new materials or proposed design changes, can be dried and impregnated under the same precisely controlled conditions that can later be duplicated in actual factory production.

Only by making and testing a complete cable can service life expectancy be properly evaluated.

This pilot plant is another of the tools of Okonite-Callender research that, in the manufacture of oil-impregnated paper-insulated cables, make possible such improvements as: *metallized tapes* that retard insulation deterioration; *stabilized lead* that eliminates lead sheath defects; and *uniform thickness of lead sheath* made possible by the use of the "magic eye" electric concentricity gauge.

When you are considering paper-insulated cable, it will pay you to have our engineers explain the many Okonite-Callender research developments that contribute to longer cable life.



Connected through the oven wall to the drying and impregnating tank, this storage tank in the pilot plant is used for degassing, drying and heating the oil under vacuum before impregnating the new experimental cable.

THE OKONITE-CALLENDER CABLE CO., INC.

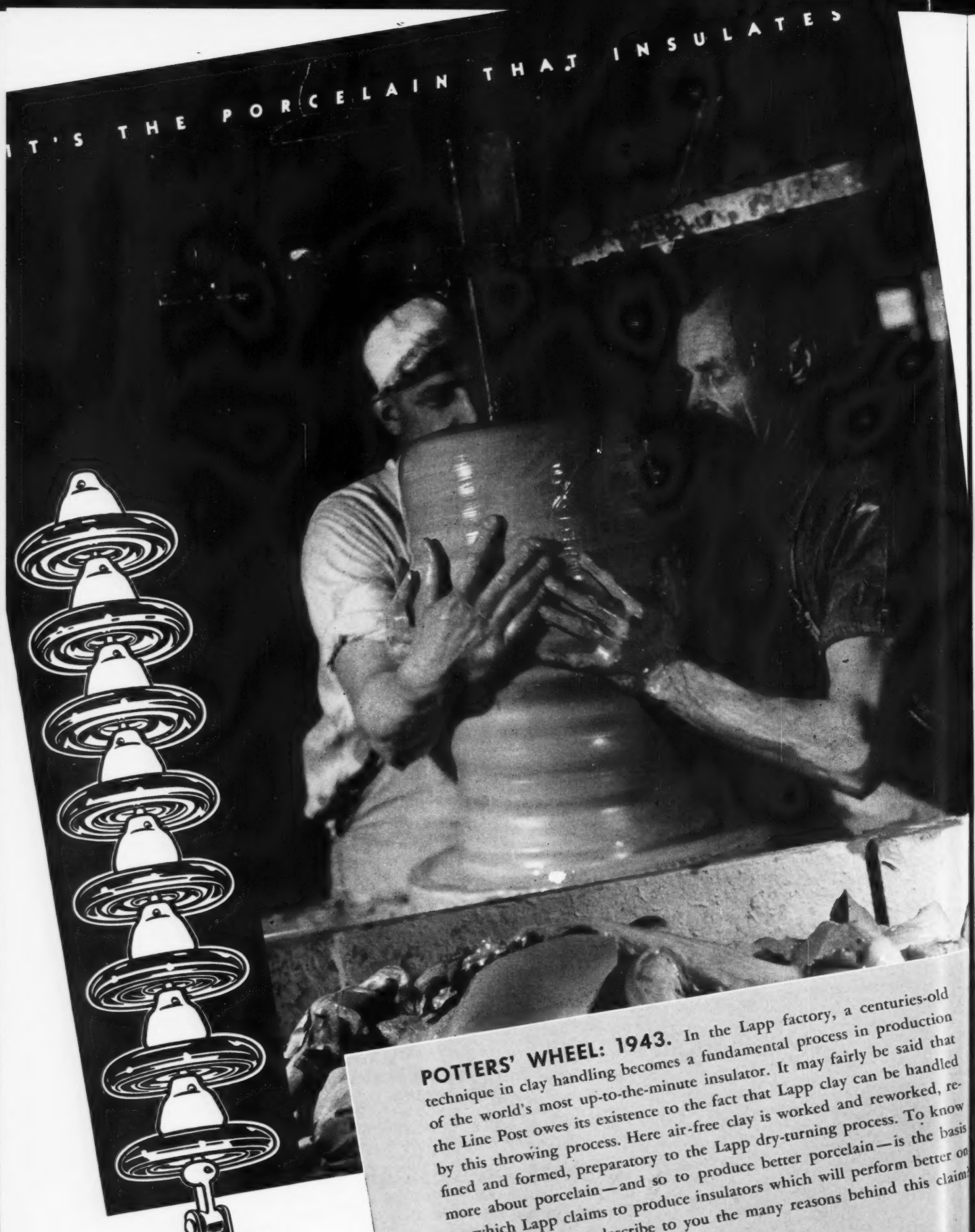
An Affiliate of The Okonite Company

Executive Offices: Passaic, N. J. • Offices in Principal Cities

OKONITE CALLENDER

PAPER INSULATED POWER CABLES

3319

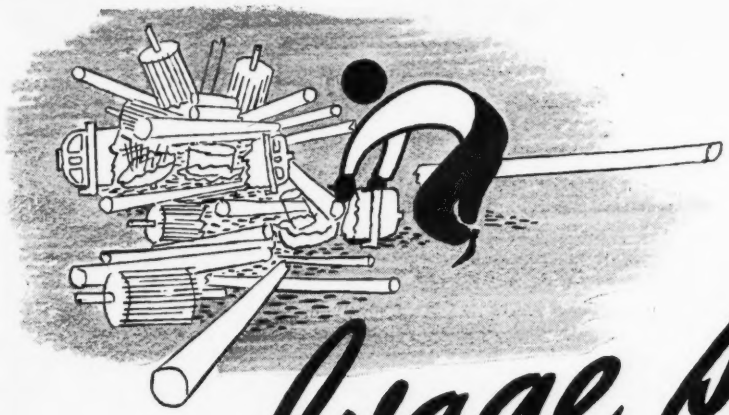


POTTERS' WHEEL: 1943. In the Lapp factory, a centuries-old technique in clay handling becomes a fundamental process in production of the world's most up-to-the-minute insulator. It may fairly be said that the Line Post owes its existence to the fact that Lapp clay can be handled by this throwing process. Here air-free clay is worked and reworked, refined and formed, preparatory to the Lapp dry-turning process. To know more about porcelain—and so to produce better porcelain—is the basis on which Lapp claims to produce insulators which will perform better on your lines. May we describe to you the many reasons behind this claim? Lapp Insulator Co., LeRoy, N. Y.

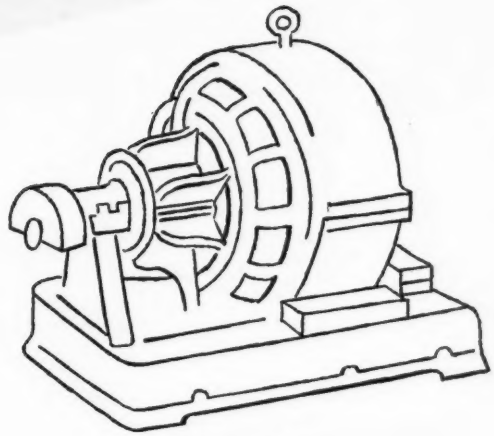
ARMY E NAVY

Lapp

Better Porcelain • Better Insulators



salvage searched



to replace broken shovel motor-shaft in one day's time

SHAFT ON 37 HP SHOVEL MOTOR SNAPPED AT 4:00 P.M. FRIDAY. MOTOR RECEIVED AT WESTINGHOUSE DISTRICT MANUFACTURING AND REPAIR PLANT 11:00 A.M. SATURDAY. STEEL FOR NEW SHAFT COULD NOT BE DELIVERED PROMPTLY. SEARCHED SALVAGE AND MACHINED LARGER MOTOR SHAFT TO CORRECT DIMENSIONS. MOTOR ASSEMBLED AND SHOVEL OPERATING AT 4:00 P.M. SUNDAY.

Westinghouse

DISTRICT MANUFACTURING AND REPAIR

J-90467

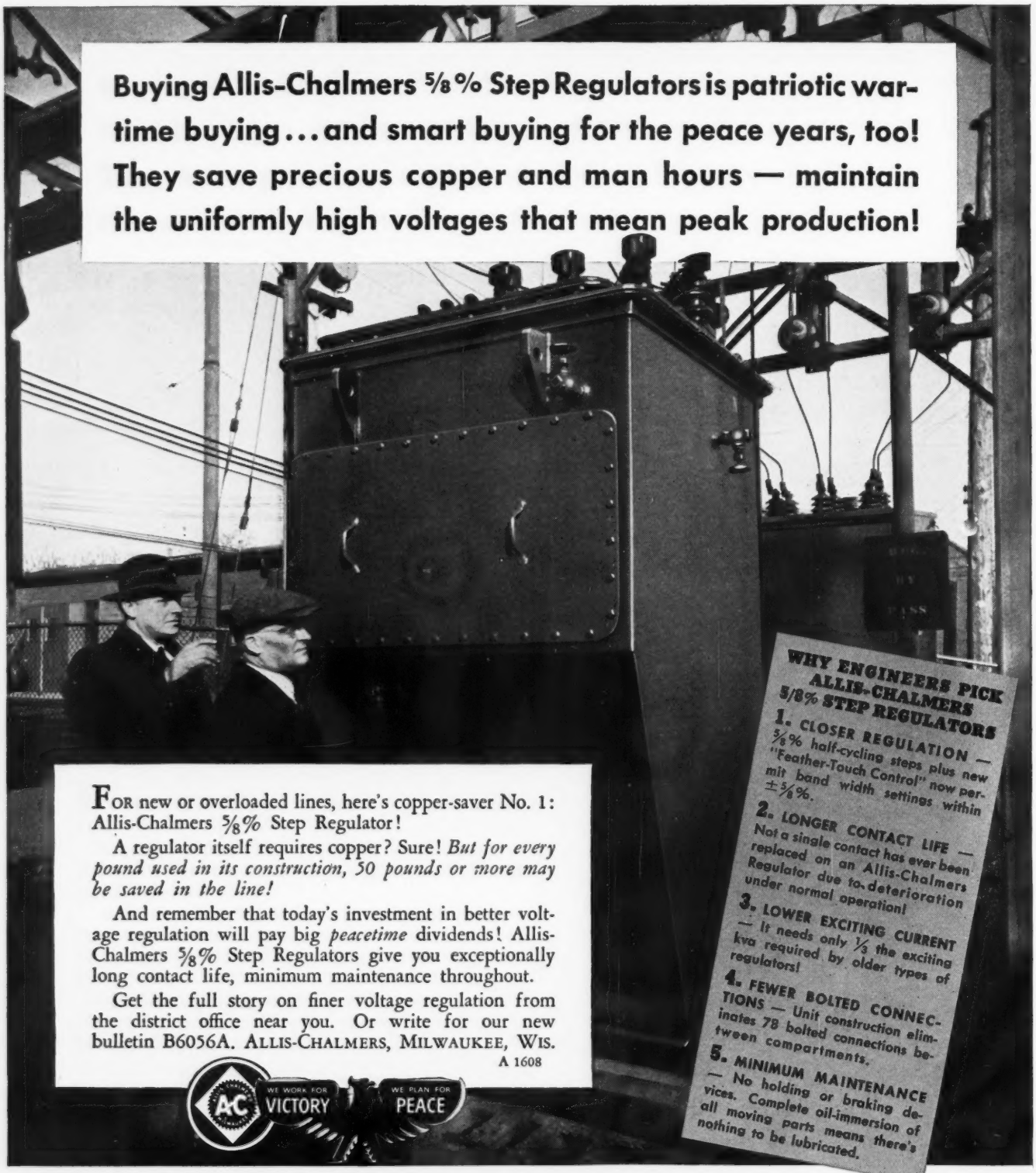
IF **THE EQUIPMENT NEEDING REPAIR IS VITAL TO THE WAR EFFORT . . . PHONE THE NEAREST OFFICE OF WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY FOR**

EMERGENCY SERVICE

33 M & R PLANTS . . . ONE NEAR YOU!

IT'S YOUR WISE INVESTMENT

For 1943 & 194x!



Buying Allis-Chalmers 5/8% Step Regulators is patriotic war-time buying... and smart buying for the peace years, too! They save precious copper and man hours — maintain the uniformly high voltages that mean peak production!

FOR new or overloaded lines, here's copper-saver No. 1: Allis-Chalmers 5/8% Step Regulator!

A regulator itself requires copper? Sure! *But for every pound used in its construction, 50 pounds or more may be saved in the line!*

And remember that today's investment in better voltage regulation will pay big *peacetime* dividends! Allis-Chalmers 5/8% Step Regulators give you exceptionally long contact life, minimum maintenance throughout.

Get the full story on finer voltage regulation from the district office near you. Or write for our new bulletin B6056A. ALLIS-CHALMERS, MILWAUKEE, WIS.

A 1608

A-C WE WORK FOR VICTORY WE PLAN FOR PEACE

WHY ENGINEERS PICK ALLIS-CHALMERS 5/8% STEP REGULATORS

1. CLOSER REGULATION — 5/8% half-cycling steps plus new "Feather-Touch Control" now permit band width settings within ±5/8%.

2. LONGER CONTACT LIFE — Not a single contact has ever been replaced on an Allis-Chalmers Regulator due to deterioration under normal operation!

3. LOWER EXCITING CURRENT — It needs only 1/3 the exciting kva required by older types of regulators!

4. FEWER BOLTED CONNECTIONS — Unit construction eliminates 78 bolted connections between compartments.

5. MINIMUM MAINTENANCE — No holding or braking devices. Complete oil-immersion of all moving parts means there's nothing to be lubricated.

ALLIS-CHALMERS 5/8% STEP REGULATORS

SIMPLEX WIRES AND CABLES *After the War*

YOU may have wondered how insulated wires and cables that you will buy after the war will differ from those that have served you so well. No one knows all the answers but we can make some predictions about Simplex wires and cables, based on past experience and present developments.

SINCE 1885 Simplex has devoted all its energies to providing insulated wires and cables needed by the rapidly expanding electrical industry. Our aim has been not only to meet requirements by keeping abreast of industry development but, if possible, to anticipate its needs. Simplex in this has earned a reputation as a pioneer in cable engineering.

The adjustments made necessary by military needs and the unusual demands of war-time industry always have stimulated research and led to better products for commercial use later. The present emergency is no exception. Cable developments now taking place cannot be discussed but definite and important changes are being made which can be adapted to commercial uses when victory has been achieved.

Simplex research and pioneering of the past now enables us to play an important part in many of the present day developments. When the war is over, Simplex will provide for commercial use the improved wires and cables developed during this war. Simplex trade names that have meant quality and service in the past will mean the same again but in greater degree.

Simplex Wire & Cable Co., 79 Sidney Street, Cambridge, Mass.

Simplex WIRES and CABLES

PACIFIC COAST OFFICES

390 Fourth St.
San Francisco, Calif.

910 East Third St.,
Los Angeles, Calif.

503 Polson Bldg.
Seattle, Wash.

WHEN WIND GOES ON THE WARPATH

Graybar's Utility Supply-Corps can help speed up your "comeback"

This year, damaging winds will be working for the enemy. A fast "comeback" is more vital than ever for the power lines on which war industry and war agriculture depend.

Here, just as on the fighting fronts, fast action may hinge on the service of supply. And GRAYBAR is mobilized and ready to help you when sudden emergencies strike, despite the unavoidable restrictions on its everyday service.

Recently, for example, a rush shipment of poles was made despite the fact that no flat-cars were available. GRAYBAR arranged for shipping them in gondola cars! Similarly, with hardware, insulators, cable, guy strand and the like: wherever they are essential to fast restoration of service, GRAYBAR will get them through!

Naturally, it takes more than just *wanting to help* to do it. Technical understanding of your needs, "know-how" on priority and transport, and a network of warehouses stocked to make the most of limited supplies — all these factors will be working for you.

Many utilities keep closely in touch with GRAYBAR all the time to insure most effective cooperative action should trouble strike. Is yours one of them?

Executive Offices: GRAYBAR BUILDING New York, N. Y.

GraybaR

IN OVER 80 PRINCIPAL CITIES

Everything Electrical . . . THAT IT TAKES TO WIN!

CLYDE SUNDERLAND PHOTO

PLAN TOMORROW'S NEEDS TODAY

Until this conflict is unconditionally won, vital and essential war requirements must be supplied, *first*. At the same time, plans for tomorrow's construction, extension or replacement of transmission and distribution lines must not be neglected, for they can not be worked out overnight. Infinite amounts of time, study and detail are required. There's therefore no time like the present to formulate plans and survey future needs in preparing for postwar power demands. In making your plans—plan to "Hang the load on Hubbard Pole Line Hardware." By letting us know your anticipated needs, we will be better able to keep our plans in line with yours.

Plan to AGAIN USE HUBBARD HARDWARE

- ★ STANDARD POLE LINE HARDWARE
- ★ CABLE MATERIAL FOR OVERHEAD AND UNDERGROUND CONSTRUCTION
- ★ COMMUNICATION SYSTEM HARDWARE
- ★ ELECTRIC RAILWAY HARDWARE
- ★ INSULATOR PINS
- ★ POLE TOP FIXTURES AND STEEL CROSS ARMS
- ★ STRAIN INSULATORS AND CLEVISES
- ★ HIGH TENSION MATERIAL
- ★ SECONDARY RACKS AND ACCESSORIES
- ★ POLE AND CROSS ARM BRACKETS
- ★ WIREHOLDERS AND HOUSE BRACKETS
- ★ EXPANSION BOLTS
- ★ STREET LIGHTING EQUIPMENT
- ★ LIGHTNING ARRESTORS
- ★ RURAL ELECTRIFICATION MATERIAL

★ FOR HIGH ACHIEVEMENT ★

ARMY NAVY

"A CENTURY OF SERVICE"

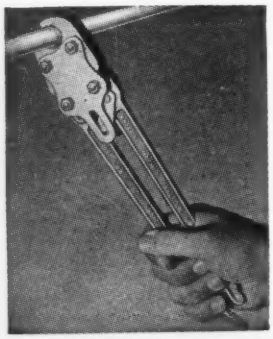
Hubbard and COMPANY

OAKLAND, CAL. PITTSBURGH CHICAGO

HANG THE LOAD ON HUBBARD HARDWARE

You Conserve Critical Steel When You Use BRIEGEL FITTINGS

In every Briegel fitting there's a saving of 25% on steel over any other fittings on the market. For use on interior jobs they're approved. (*And*, incidentally, there's a *25%* saving of TIME, too when you use B-M fittings!)



DISTRIBUTED BY

The M. B. Austin Co., Chicago, Ill.
Clayton Mark & Co., Evanston, Ill.
Clifton Conduit Co., Jersey City, N. J.
General Electric Co., Bridgeport, Conn.
The Steelduct Co., Youngstown, Ohio
Enameled Metals, Pittsburgh, Pa.
National Enameling & Mfg. Co., Pittsburgh, Pa.
Triangle Conduit & Cable Co., New Brunswick, N. J.

BRIEGEL METHOD TOOL CO., Galva, Ill.

IT'S *ALL* DONE WITH MIRRORS

Yes, Curtis makes use of Silver Mirror Glass as the reflecting surface for "X-Ray" Industrial Lighting Units. War plants throughout the country find these units the ideal equipment for increasing production, improving workmanship and reducing spoilage.

"X-Ray" Silver Mirror Reflector Units are outstandingly efficient and satisfactory from a lighting standpoint and are also very economical because of ease of installation, low maintenance cost and long life. *They contain very little iron and steel and are well within government requirements.*

Various sizes and types are available for incandescent lamps up to 1500-watts, and for the 400-watt Mercury Vapor lamp.

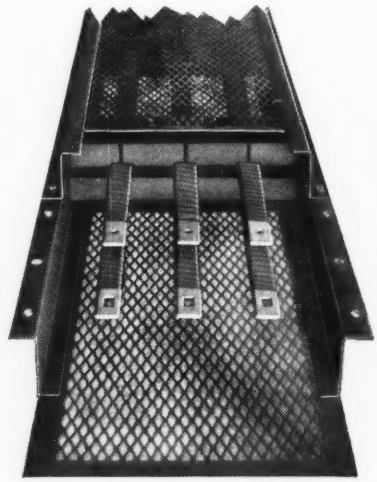
"X-Ray" Silver Mirror Reflector Units are carried in stock for immediate delivery. Write us today for complete catalog information and prices, or get in touch with your local Curtis representative.

CURTIS LIGHTING, INC.
6135 W. 65th STREET CHICAGO, ILLINOIS

PRODUCTS *that are news*

Bus Duct (800)

BullDog Electric Products Co. is offering a redesigned ventilating type feeder bus duct with a screened casing of expanded metal in place of the solid metal casing used previously. It is claimed that the new design provides better performance since the complete ventilation afforded by the screen casing assures low operating temperatures and increased current carrying capacities. The parent-phase bus bar arrangement within the casing assures uniform current density through reduction of "skin effect" and "proximity effect," according to the manufacturer. Available in new WPB ratings of 800, 1,000, 1,350, 1,600 and 2,000 amp. single phase, three-phase and four wire, three phase, 600 volts or less. It can be used for feeders alone or in conjunction with the company's branch circuit plug-in type Bustribution Duct, it is stated.



Coil-Turn Counter (801)

General Electric Co. has announced an improved coil-turn counter for use in laboratory or factory to determine the number of turns in wound electric coils. The new counter is said to be more compact in design than the previous model and to incorporate a magnetizing current control box simplifying installation. According to the manufacturer, this counter is capable of checking or determining the effective turns of coils ranging from 1 to 11,110 turns at a rate of from 80 to 100 coils of like specifications per hour.

Heating Equipment (802)

Girdler Corp. has announced new Thermex high frequency heating equipment, which it claims will heat almost any nonmetallic material uniformly throughout in a matter of minutes. According to the manufacturer, heating is accomplished within the article or molecule itself by reason of its molecular resistance to the high voltage, high frequency current passed through it from flat electrode plates covering opposite sides or top and bottom of the mass to be heated.

Synonymous with Quality!

Wagner TRANSFORMERS

reflect sound engineering and modern manufacturing methods . . .

★ ★ ★

POWER
DISTRIBUTION
AIR-COOLED
NOFLAMOL*
(NON-INFLAMMABLE LIQUID FILLED)

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

WAGNER BRANCH OFFICES

ATLANTA
BALTIMORE
BOSTON
BUFFALO
CHICAGO
CINCINNATI
CLEVELAND
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MEMPHIS
MILWAUKEE
MINNEAPOLIS
NEW YORK
OMAHA
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PITTSBURGH
PORTLAND
ST. LOUIS
SALT LAKE CITY
SAN FRANCISCO
SEATTLE
SYRACUSE
TULSA
WASHINGTON, D.C.

In army camps, ordnance and power plants, in the oil fields, and throughout the chemical and steel industries, Wagner transformers daily demonstrate their excellence in quality. From the very beginning, the name Wagner has been *synonymous with quality.*

If you are in need of transformers to complete your war production schedules, consult the nearest of Wagner's 29 branch offices, located in principal cities and manned by trained field engineers.

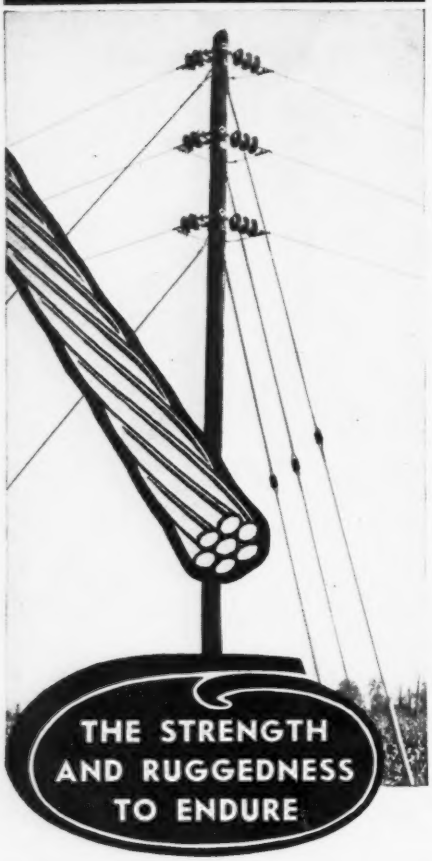
Write
FOR BULLETINS
TU-33 (NOFLAMOL)
TU-181 (POWER)
TU-180 (DISTRIBUTION)

T43-4

★ ★ ★

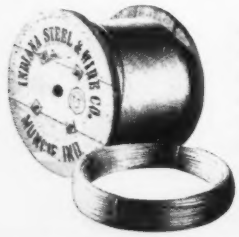
Wagner Electric Corporation
ESTABLISHED 1891
6381 Plymouth Avenue, St. Louis, Mo., U. S. A.
ELECTRICAL AND AUTOMOTIVE PRODUCTS

Crapo
GALVANIZED STEEL
STRAND



STRENGTH to support the pole structure under maximum ice and wind loading ... RUGGEDNESS to withstand the punishment incurred in construction and service .... DURABILITY that outlasts the normal life of the line .... are combined---with important ECONOMY---in *Crapo* Galvanized Steel Strand.

Each size and grade develops the full tensile strength of the steel in cross section. The heavy, ductile, tightly-bonded zinc coating---applied by the famous *Crapo* Galvanizing Process---provides lasting protection against corrosion.

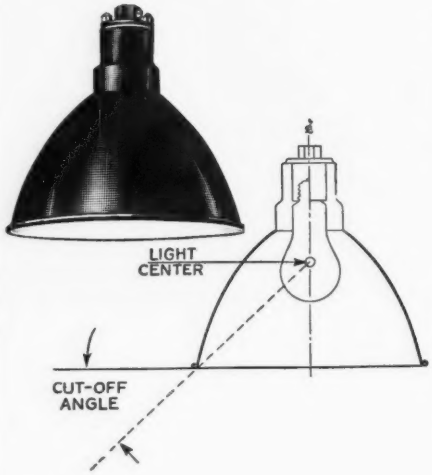


There is a size and grade of *Crapo* Galvanized Steel Strand for every practical need. Consult the distributor of *Crapo* Galvanized Products near you or write direct for further information!

INDIANA
STEEL & WIRE CO.
MUNCIE, INDIANA

Deep Bowl Reflectors (803)

Steber Mfg. Co. has a new line of deep bowl reflectors, made in four diameter sizes —7½, 10½, 15 and 17½ in. Shade holder types are made in several sizes for use with 60 to 200-watt lamps. Detachable socket types are for use with 60 to 1,500-watt lamps. Standard finishes are green for the outside and white for the inside, either ultranamel or porcelain enamel.



Transformers (804)

A new series of dry type natural draft transformers has been announced by General Electric for indoor use on 600 volts and below. According to the manufacturer, size and weight of the transformers have been materially reduced as compared with the previous series, and ventilation has been made more effective by slanting lovered side plates inward at the bottom and top of the case, permitting a directed flow of air through the case vertically.

The unit has a two-legged core with a high and low voltage coil on each leg. The core is clamped at its top and bottom, with the bottom clamps also serving as mounting feet. It is claimed that the transformer can be mounted against a wall or close to other units with little or no effect on temperature rise. The coils are exposed for maximum cooling with a large portion of their copper outside the core, and the high and low voltage coils are concentric with air ducts between them to provide extra insulation and cooling.

According to the announcement, use of two small instead of one large coil has permitted a design with more turns of smaller wire for the same copper loss, resulting in lower exciting current and lower inrush currents when the primary of the transformer is energized.

Coolant Cooler (805)

Frostrode Products offers a cooler designed for automatic temperature control of coolants and lubricants in machine processing. The manufacturer claims that it is adaptable to virtually any type of machine involving the use of coolants and recommends it for heavy cutting and high pressure grinding operations.

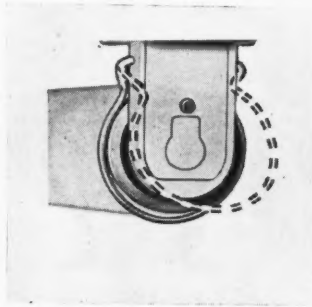
The portable unit is 30¾ x 22½ x 28-in. high and is on casters. It utilizes an air-cooled compressor and is said to operate independent of water services. Standard compressor motors are designed for 220,440 volts three-phase or 115,230 volts single phase and are rated at ¾ hp., 60 cycles. Motors for other voltages and for 25 and 50 cycles can be supplied, the manufacturer states. Rated capacity is 18 gal. per minute when cooled down to 20°F. below room temperature. Is said to handle any conventional coolant.

Milling Machine (806)

A vertical bench milling machine with an attachment for horizontal milling is offered by Benchmaster Tool Co. This machine is powered by a 1/3-hp. motor. The manufacturer states that the spindle head is supported by an arm 2½ in. in diameter, which can be adjusted to rotate the spindle 60° either side of center. A floating motor mount gives proper tension on the V-belt at all times, it is claimed, and changes of the four spindle speeds—450, 850, 1,400 and 2,100 rpm.—are possible without tools.

Lamp Lock (807)

To minimize the risk of lamps falling from sockets, the Miller Co. has incorporated a patented safety lamp lock in its new Aero-Designed fluorescent fixtures. According to the manufacturer, the device is simple in construction and will not interfere with fixture relamping and cleaning.



Selenium Rectifiers (808)

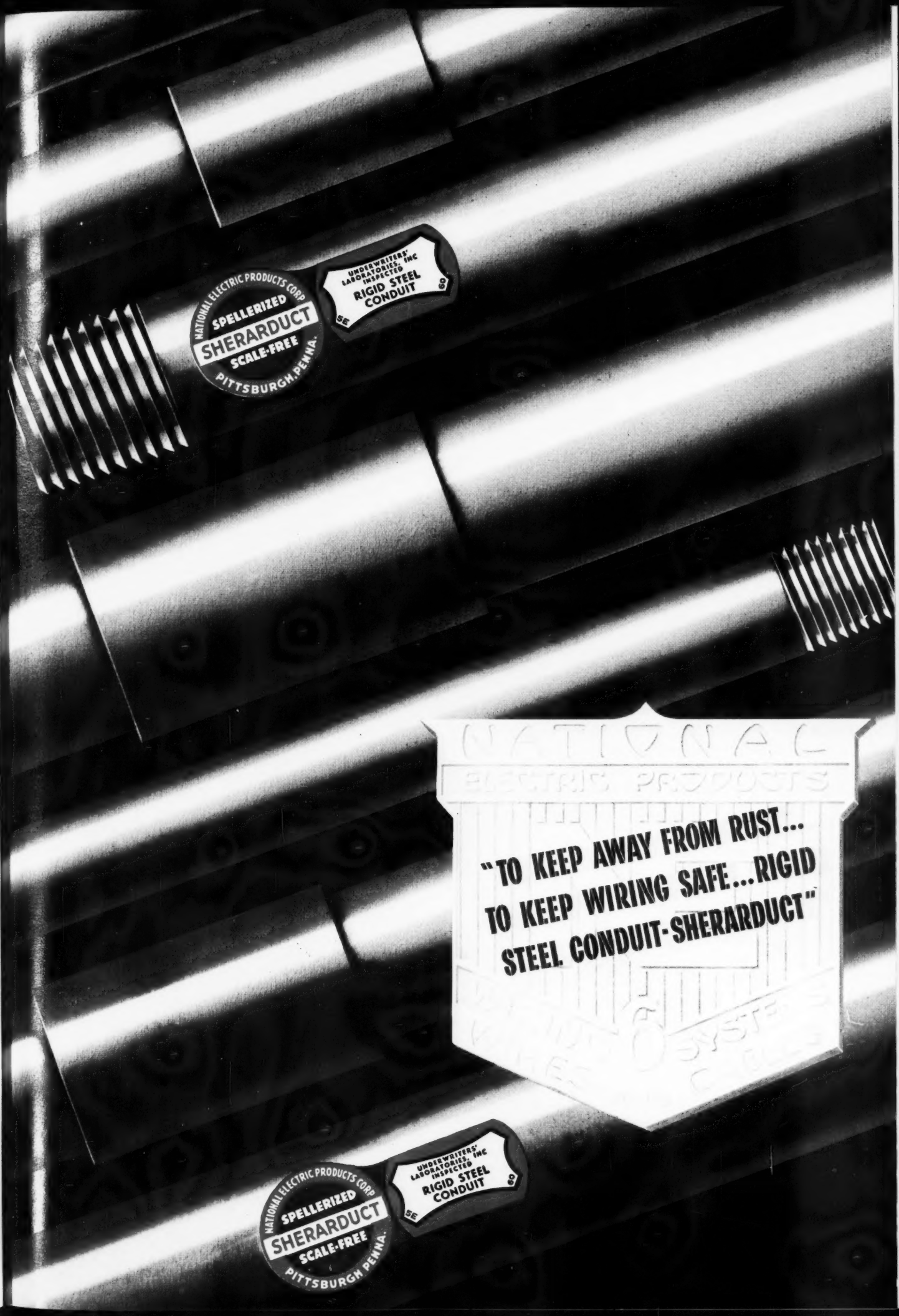
Addition of selenium rectifier stacks to its Tungar and copper oxide rectifier line has been announced by General Electric Co. According to the announcement, electrical characteristics of selenium rectifiers have been improved for more efficient conversion from a-c to d-c. Advantges of the selenium stacks are said to be their light weight and small size. They can be bolt mounted or stud mounted direct to equipment assemblies and are available also with mounting brackets of various types.

F-Lamp Starter (809)

A glow-type fluorescent lamp starter, "Glostat," has been introduced by Sylvania Electric Products, Inc. It is available in two sizes, one for use with 15 and 20-watt lamps, the other for 30 and 40-watt lamps. The "Mirastat," which is being continued in the line, is available in four sizes: for 15 and 20-watt lamps; 30 and 40-watt lamps; 100-watt lamp; and 65-watt lamp.

Voltage Regulator (810)

Avia Products Co. is manufacturing a base assembly voltage regulator for use wherever called for under Army air force specification 40D8445-2. This base assembly is for aircraft, tanks or auxiliary power units in conjunction with a voltage regulator.


NATIONAL ELECTRIC PRODUCTS CORP
SPELLERIZED
SHERARDUCT
SCALE-FREE
PITTSBURGH, PENNA.
UNDERWRITERS' LABORATORIES, INC INSPECTED
RIGID STEEL CONDUIT
SE
"TO KEEP AWAY FROM RUST... TO KEEP WIRING SAFE...RIGID STEEL CONDUIT-SHERARDUCT"
NATIONAL ELECTRIC PRODUCTS CORP
SPELLERIZED
SHERARDUCT
SCALE-FREE
PITTSBURGH PENNA.
UNDERWRITERS' LABORATORIES, INC INSPECTED
RIGID STEEL CONDUIT
SE

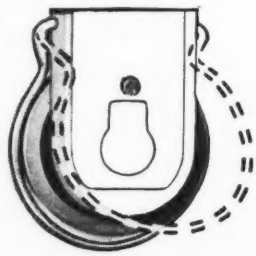
BUY THE FLUORESCENT LIGHTING WITH THIS *EXTRA* SAFETY FEATURE!

TAKE a good look at the little sketch below. It shows an exclusive feature of MILLER *AERO-DESIGNED* fluorescent lighting — a patented safety lamp lock that minimizes the danger of lamps falling.

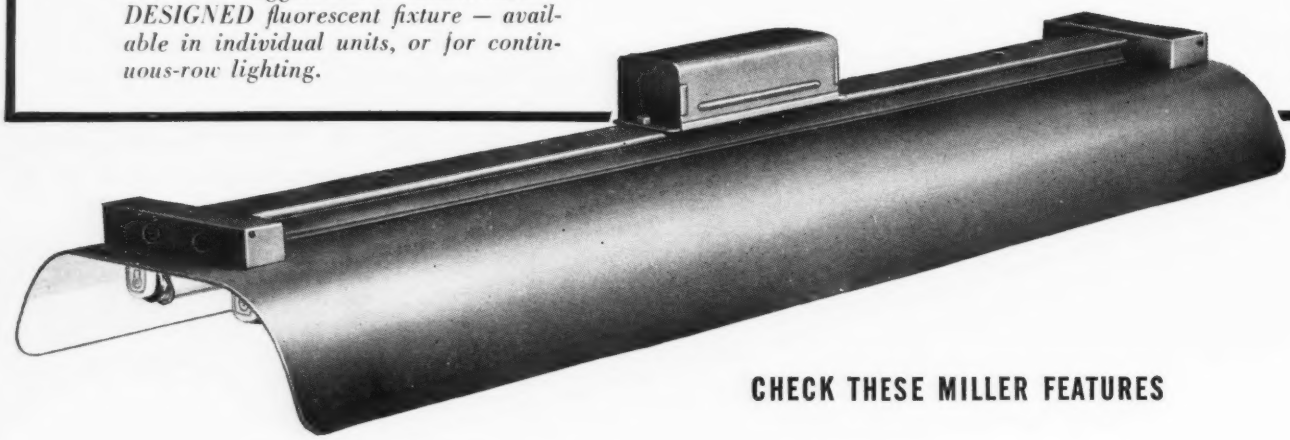
It's a very important feature to any man investing in fluorescent lighting today.

This patented safety lamp lock is an integral part of each socket, simple in operation and foolproof. It's a MILLER "extra" — and your protection against costly plant accidents.

Other noteworthy features of MILLER *AERO-DESIGNED* fluorescent are itemized below. Check them carefully, then call in a MILLER field engineer (located in principal cities) for a talk about *your* plant lighting.



Here's the rugged new MILLER AERO-DESIGNED fluorescent fixture — available in individual units, or for continuous-row lighting.



CHECK THESE MILLER FEATURES

REFLECTORS are of Masonite with durable IVANITE. the "sealed-in-surface" finish for high reflection factor. Lightweight, easy to remove, simple to clean. Reflectors are "extra length" for good shielding of lamp ends. Miller reinforcing reflector attachment strap assembly is an integral part of each reflector—no change required for either two or three-light units.

WIRING CHANNELS, now streamlined, contain all necessary wiring and auxiliaries—with ballasts exposed for heat dissipation. Can be used as individual lighting units or in continuous rows.

FLANGED TOP of channel permits clamp strap attachment at various points along channel, for ceiling, rod or cable mounting to suit any ceiling structure. Also can be suspended with chains, conduit or combinations of these methods.

MILLER SAFETY SOCKETS with integral safety lock to prevent lamps from falling are rigidly spaced and substantially mounted.

FIXTURES carry both Underwriters' and RLM Standards labels — are backed by written warranty and MILLER'S almost 100 years of lighting experience.

THE MILLER COMPANY • MERIDEN, CONNECTICUT

ILLUMINATING DIVISION
Fluorescent, Incandescent
Mercury Lighting Equipment

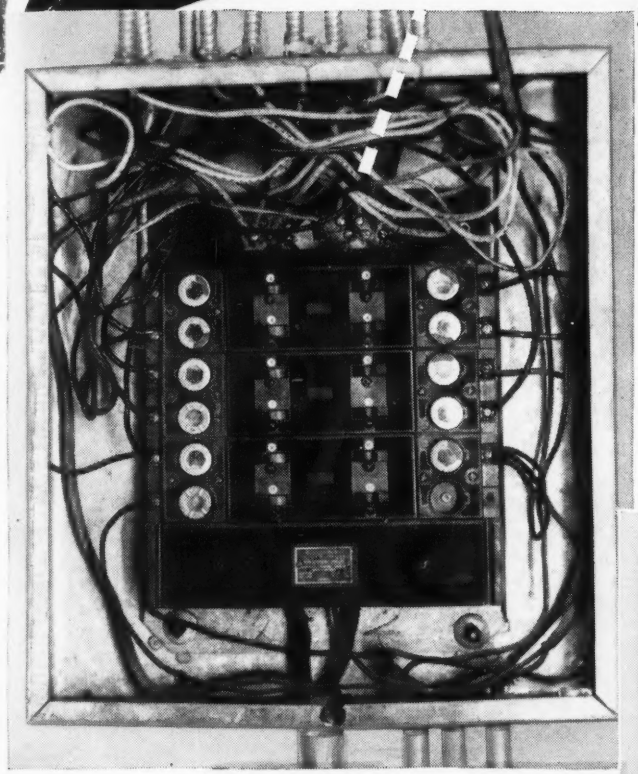
OIL GOODS DIVISION
Domestic Oil Burners
and Liquid Fuel Devices

ROLLING MILL DIVISION
Phosphor Bronze and Brass
in Sheets, Strips and Rolls

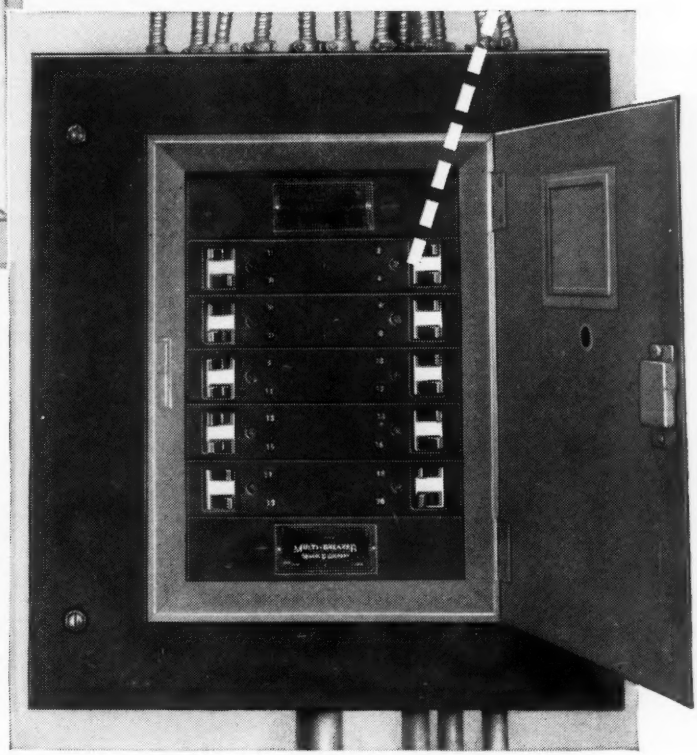
WAR CONTRACTS DIVISION
War Materiel

MILLER
SINCE 1844

Problem AND Solution



Problem: An obsolete and overloaded fusible type panel. It provided only 12 lighting and power circuits. More were needed.



Solution:
A new Square D Multi-breaker panelboard, installed in the old box, using the same conduit. Provides 20 circuits . . . 66⅔% more capacity.

Multi-breaker lighting and distribution panels, when installed in existing panel boxes, usually increase the number of circuits by more than 50%. They eliminate fuses completely . . . provide modern convenience and protection. There are literally hundreds of plants that can profit tremendously by such conversion . . . right now.

ELECTRICAL EQUIPMENT • KOLLSMAN AIRCRAFT INSTRUMENTS

SQUARE D COMPANY

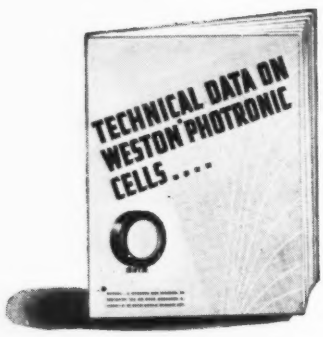
LOS ANGELES • DETROIT • MILWAUKEE

Photronic Cells now being made for war purposes only, hold many new possibilities for design engineers searching for better methods or new products for post-war markets.

The improved Type 3 photo-cell has a marked increase in sensitivity and can be produced in various outputs and various linearity factors, to meet specific circuit requirements. They can be matched in spectral sensitivity, too; to give practically the same spectral response curve throughout the color spectrum. And since the fatigue factor has been materially reduced, their response is more uniform, and far more rapid.

The development of the Type 3 is the result of continued research and experience in the processing of photo-cells dating back to 1930 . . . the year in which WESTON introduced the first American-made commercial cell of the barrier-layer type.

Type 3 Photronic Cells can be supplied in various styles and cases, as well as unmounted in a variety of shapes and sizes. Complete technical data, in booklet form, available to design engineers on request. Weston Electrical Instrument Corporation, 577 Frelinghuysen Avenue, Newark, New Jersey.



*PHOTRONIC—*A registered trademark designating the photoelectric cells and photo-electric devices manufactured exclusively by the Weston Electrical Instrument Corp.*

Laboratory Standards . . . Precision DC and AC Portables . . . Instrument Transformers . . . Sensitive Relays . . . DC, AC, and Thermo Switchboard and Panel Instruments.

WESTON

Specialized Test Equipment . . . Light Measurement and Control Devices . . . Exposure Meters . . . Aircraft Instruments . . . Electric Tachometers . . . Dial Thermometers.

FOR OVER 54 YEARS LEADERS IN ELECTRICAL MEASURING INSTRUMENTS

WESTERN REPRESENTATIVES

Seattle, Wash. Eicher & Bratt, 262 Colman Bldg.

San Francisco, Calif. Herman E. Held, 420 Market St.

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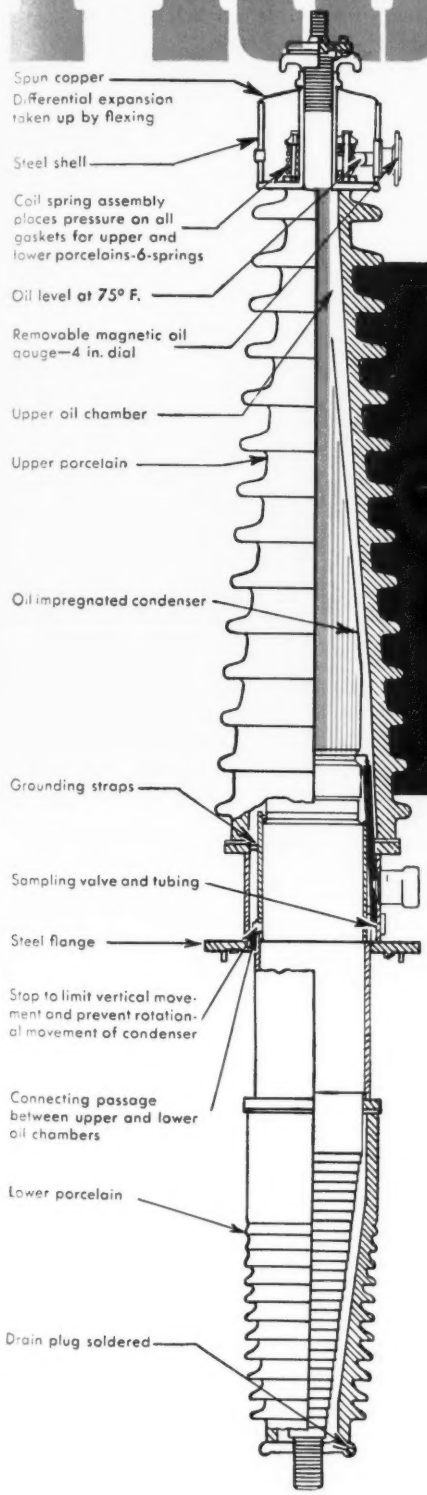
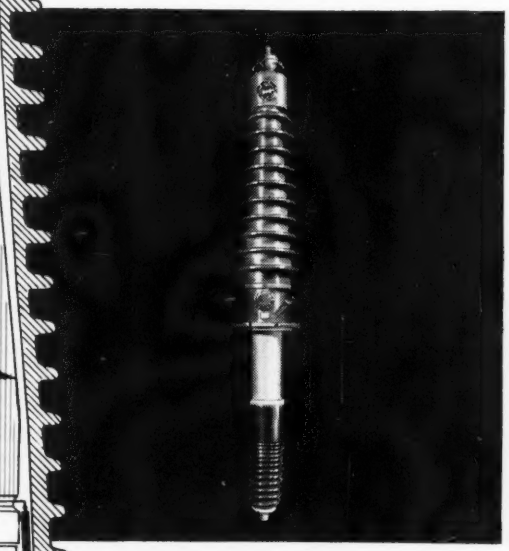
Phoenix, Ariz. J. E. Redmond Co., 448 W. Madison St.

PROTECTED

From the inside out


Spun copper
Differential expansion taken up by flexing
Steel shell
Coil spring assembly places pressure on all gaskets for upper and lower porcelains-6-springs
Oil level at 75° F.
Removable magnetic oil gauge—4 in. dial
Upper oil chamber
Upper porcelain
Oil impregnated condenser
Grounding straps
Sampling valve and tubing
Steel flange
Stop to limit vertical movement and prevent rotational movement of condenser
Connecting passage between upper and lower oil chambers
Lower porcelain
Drain plug soldered



THE WESTINGHOUSE OIL-IMPREGNATED CONDENSER BUSHING

You have to look *inside* the Type "O" Condenser Bushing to find the real insulation—*the condenser*. The outside porcelain serves primarily as a weather casing; the oil filling as a secondary sealing agent. But the real job of isolating high voltage from ground is done by the *exclusive* Condenser Insulation.

Just like the leaf springs in your car, this design distributes stresses uniformly. This means long life for the dielectric material, uniform electrical performance, negligible radio interference and minimum size.

As a permanent seal against moisture, all joints of the Type "O" Bushing above oil level are soldered or brazed, while gaskets are used below the oil level. The oil-filled space between the condenser and the porcelain acts as a reservoir insuring that the condenser will always be surrounded with oil and completely impregnated. A magnetic oil gage continuously indicates the level of the oil.

Your Westinghouse representative has further details on the Type "O" Condenser Bushing. Consult him, or write: Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., Dept. 7-N.

J-60537

Westinghouse supplies Type "O" Oil-impregnated Condenser Bushings for service voltages from 92 to 230 kv. Type "O" Bushings of the same voltage and current ratings are interchangeable between oil circuit breakers and large power transformers.

Westinghouse

PLANTS IN 25 CITIES... OFFICES EVERYWHERE

CONDENSER BUSHINGS

DANGER SPOTS

Care and Repair "In Time" through Regular Cable Inspection

WHAT GOES ON down every manhole today is of utmost importance to metal reserves and war production. Unnecessary cable failures can be eliminated by periodic inspection. Those large industrials and electric utilities who have made regular, careful manhole inspection routine are making an important contribution to Victory.

Here are two maintenance tips to give manhole installations longer life wherever lead cable is used:

RERACK WRINKLED CABLES TO HIGHER RACKS

This eliminates sharp bends and prevents wear on wrinkled portions. Install porcelain bells at cable duct entrances to eliminate damage from sharp edges. Duct shield may be slid in at duct mouth with metal shield around cable to hold it—to prevent wear.

FIREPROOFING OF CABLE

Prevent communicating faults through fireproofing. On higher voltages—13 to 25 kv, apply cement or other equivalent or preferred flameproofing material on all exposed cable in manhole. Lead cable sheath should receive a protective coating before either cement or asbestos or other flameproofing is applied.

★ ★ ★

Inspect manhole cables regularly. Make repairs promptly. Use Roebling paper—and lead-insulated cables for long service on underground transmission, distribution or service circuits.

JOHN A. ROEBLING'S SONS COMPANY OF CALIFORNIA

San Francisco • Los Angeles • Seattle • Portland

BELTED TYPE—For phase to phase voltage up to 20 KV.

SHIELDED TYPE—For three-phase grounded neutral circuits at from 10 to 35 KV.

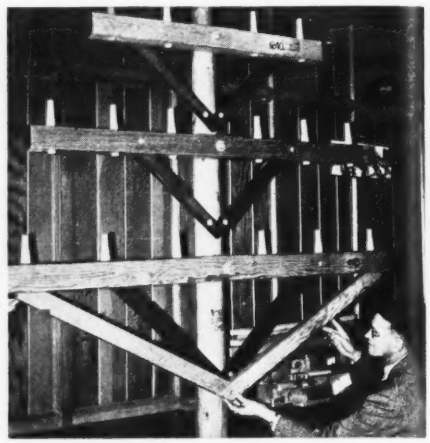
ROEBLING

ELECTRICAL WIRES AND CABLES

Wood Crossarm Braces (811)

Crossarm braces and guy guards made of treated wood are offered the electrical industry in lieu of metal braces and guards by the Rainier Crossarm Co., of Chehalis, Wash. The company makes several types for various applications. A light brace is made with a side arm bolt hole. It is angled to fit with a 45° joint at the pole. The heavy type is notched for bolting underneath to support the arm from below. This type is tongued for a proper fit at the pole.

The wood is especially treated and fitted with either a bolt and nut or a rivet across

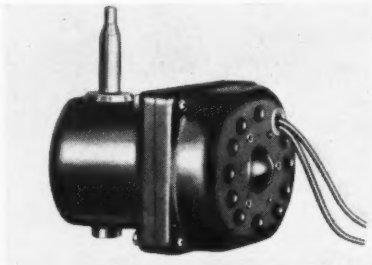


the grain at the bolt holes for reinforcement. Tests with a dynamometer, the manufacturer claims, show the wooden brace to have one and a half times the compressive strength of any comparable metal brace. Better dielectric qualities are also claimed for it. Tests have shown the brace to be stronger than the lag bolt holding it.

The company also makes a wooden guy wire guard of seasoned Douglas fir as well as ground wire molding. The Victory guy guard is made in sections 2 ft. long to meet various requirements. Larger bottom sections are designed to cover eyebolt and splice clamp. A pentachlorophenol stain is used as wood preservative, water repellant and insecticide as well as carrier for the pigment.

Small Motor (812)

Rotom Mfg. Co. has announced a small, self-starting, constant speed motor, which it claims maintains superior speed regulation under wide variations of voltage, load and temperature. Measures 4⅜ x 3⅛ x 3¼ in. Available for operation on 110 or 220-volt, 50 or 60-cycle source at 14 watts input.



F-Lamp Ballast (813)

A ballast with a patented device to balance light output and power consumption of two fluorescent lamps, 90° out of phase, has been announced by Superior Electrical Industries. Weight two pounds.

EEP THIS WAR WORKER SAFE
with the only grating that has the unique twisted bar!
No time for "absenteeism" caused by injury these days. Install non-slip Blaw-Knox steel grating. BETTER FIVE WAYS.
1 SAFE, the unique twisted bar prevents slipping in any weather
2 STRONG, one-piece electro-forged construction
3 OPEN, for light and air, easy to paint and maintain
4 SELF-CLEANING, no sharp corners to clog with dirt
5 ECONOMICAL, and easy to install
BLAW-KNOX DIVISION of Blaw-Knox Co.
2098 FARMERS BANK BUILDING • PITTSBURGH, PA.
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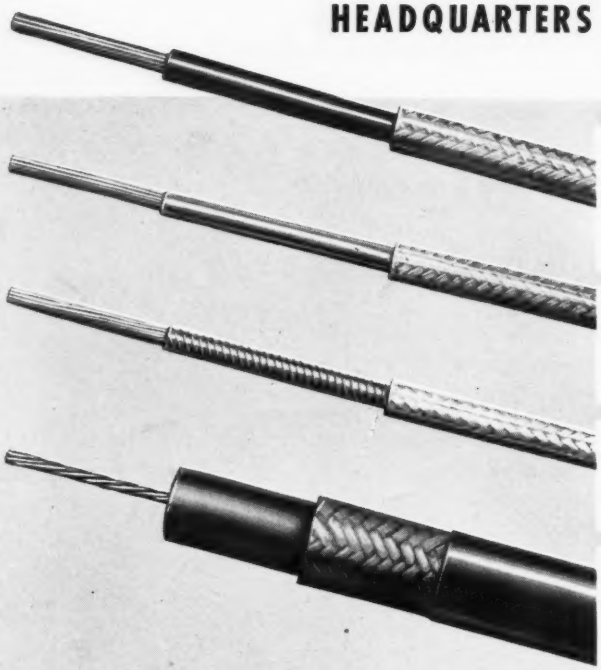
SAN FRANCISCO W. S. Wetenhall
LOS ANGELES E. M. Ornitz
SEATTLE Geo. Montgomery
BLAW-KNOX STEEL GRATING
ARMY NAVY
THE TWISTED BAR MAKES IT SAFE!
★ ★ FOR VICTORY BUY U. S. WAR BONDS AND STAMPS ★ ★ ★

need AN-JC-APPROVED AIRCRAFT WIRE?

ASK FOR "ESSEX" AT TRI-STATE

HEADQUARTERS FOR BOTH 48 AND 56



Vinylite and Cotton (AN-J-C-48)—Consists of flexible tinned copper, protected by Vinylite (a synthetic rubber), and covered with cotton braid (coated with a special lacquer). Sizes from 22 to 4/0. Thorough dielectric properties and tough braid throughout.

Cotton and Glass (AN-J-C-48)—Consists of flexible tinned copper, served with double fiberglas, and strengthened with cotton braid (coated with a special lacquer). Sizes from 22 to 4/0.

100% Glass (AN-J-C)—Consists of flexible tinned copper, served with double fiberglas and covered with fiberglas braid (coated with a special lacquer). Sizes 22 to 4/0.

High Tension Ignition Aircraft Wire (AN-J-C-56)—Consists of stainless steel conductors, protected by a special rubber, strengthened with a cotton braid, and thickly coated with a black high lustre lacquer, 7mm.—Good corona resistance.

Below are descriptions of the various types of Aircraft Wire approved for use in the War Program:

AN-J-C-56: 7mm. High Tension, Steel Conductor, Rubber Insulation. Type (3) Type (2) Type (1)

AN-J-C-48: *100% Glass; Glass and Cotton; and Vinylite and Cotton Cable*

#95-27074: Varnished Cambric with Cotton Braid for Aircraft Power and Light.
#95-28003: 7 and 9mm. High Tension Copper Conductors, Rubber Insulated.
#95-32152: 5mm. High Tension, Steel Conductors, Rubber Insulated.
#95-27273: Also Shielding Specification for Shielded AN-J-C-48.

All of the above wires are resistant to heat, moisture and oil, withstand low temperatures, and have high dielectric and tensile strengths. Special flame retarding insulation is used on all types.

Whether your requirements amount to one spool or thousands, Tri-State can take care of your needs for aircraft wire. Representing the Essex Wire Corporation, they can call on the vast production facilities of the Essex plants to fill orders. Large fabricator of precision wire in normal times, Essex is using its experience and a great part of its plant capacity to produce aircraft wire. All Essex aircraft wire is subjected to rigid company Laboratory tests, exceeding AN performance requirements.

AN-J-C-56 (7 mm. High Tension Ignition Wire) and three different constructions of AN-J-C-48 (100% Glass; Glass & Cotton; Vinylite & Cotton) are available—the AN-JC in sizes 22 to 4/0. Essex can also furnish Multiple Wire Combinations and complete Prefabricated Harnesses, saving valuable assembly time. Supplementing these products, Tri-State offers a complete line of wiring and winding necessities for motors, generators, starters, transformers and relays, as well as other types of Approved Aircraft Wire listed above.

Our Engineers will be glad to help you in the selection of your electrical products and to expedite their delivery. Just wire or telephone—and our full service will be placed at your disposal.

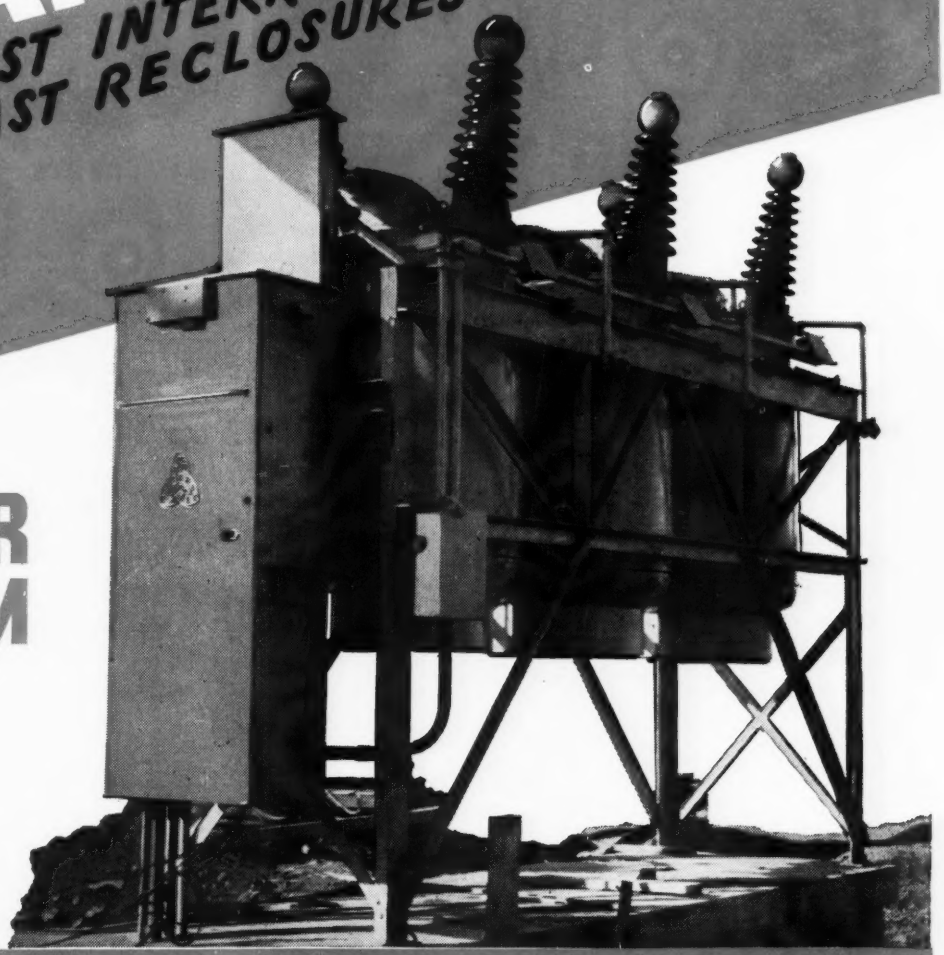
TRI-STATE SUPPLY CORPORATION

LOS ANGELES
544 S. San Pedro St.
MUtual 2354

SAN FRANCISCO
554 Bryant St.
EXbrook 8890

What Up-To-Date BREAKERS NEED

for FAST INTERRUPTIONS and FAST RECLOSURES . . . .



THE MOTOR MECHANISM ON

Pacific Electric Breakers Assures Reliability and Low Maintenance

INSTALLATION VIEW OF TYPE RDE-42, 69-KV. WITH TYPE MH-3 MOTOR MECHANISM

The prime mover of a breaker must be fast and reliable.

Years of field service have proved that the Pacific Electric Motor Mechanism stands out in speed, reliability and low upkeep for actuating Pacific Electric Breakers.

That's because the motive force for operation results from spring-stored energy. The spring is automatically pre-wound by low AC or DC current. There are no expensive station batteries, no short-life rectifiers, no air compressors. You get simplicity of design which further assures positive operation. You have easy manual closing and perfect synchronizing because of the fast, constant operating speed. First reclosures can be either immediate or time-delay, as desired.

The rapid arc extinguishment of the famous Pacific Electric Expulsion Chambers permits fast interruptions and fast reclosures. This saves on oil carbonization and offers utmost safety. For 37 years the Pacific Electric Mfg. Corporation has specialized in the manufacture of high-voltage switching equipment which has saved maintenance and offers utmost dependability for utilities the nation over. Get all the facts on Pacific Electric Breakers with the years of refinements of the automatic motor-wound spring-actuated Motor Mechanism.

C. H. Cutter
1015 Securities Bldg.
Seattle, Wash.

G. B. Kirkwood
437 S. Hill St.
Los Angeles, Calif.

J. E. Redmond Co.
448 W. Madison St.
Phoenix, Ariz.

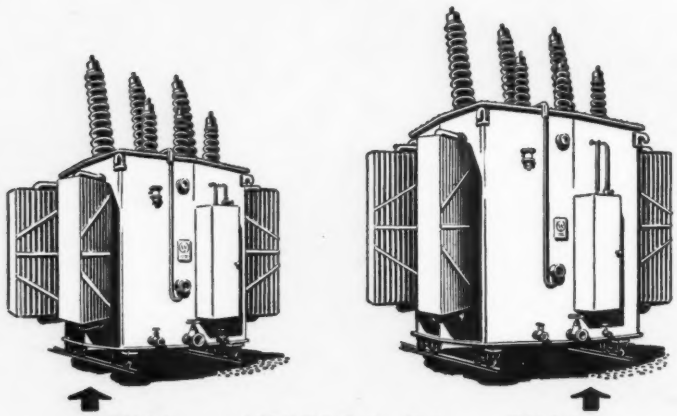
Myron Swendsen
P. O. Box 156
Boise, Idaho

Other Representatives in Principal Cities

Pacific Electric Mfg. Corporation

5815 THIRD ST., SAN FRANCISCO, 24, CALIF. DUNES HIGHWAY, GARY, INDIANA

MORE KILOWATTHOURS FOR VICTORY



THIS . . . INSTEAD OF . . . THIS

TRANSFORMER KV-A REQUIREMENT REDUCED 50%

Because of steadily increasing loads on 69 kv circuits, a large power company found it impossible to maintain good regulation at important load centers.

The proximity of a 110 kv line near one of these load centers indicated that an auto-transformer would improve conditions. An analytical solution of the loop systems involved, indicated that a 30,000 kv-a transformer would be desirable to provide an adequate factor of safety.

Loop systems are tedious to calculate analytically for all necessary conditions, so the A-C Network Calculator was used to check the results and extend the study.

Results definitely proved that a 15,000 kv-a autotransformer would be adequate under the worst conditions—a rating of 50% less than originally anticipated. Not only would the transformer serve present requirements, but by the addition of air blast equipment it could be made to serve for many years to come.

This is another example of the important work being performed on the Westinghouse A-C Network Calculator. Our engineers will be glad to co-operate with you on similar studies. A calculator study of your system may reveal equally valuable savings. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

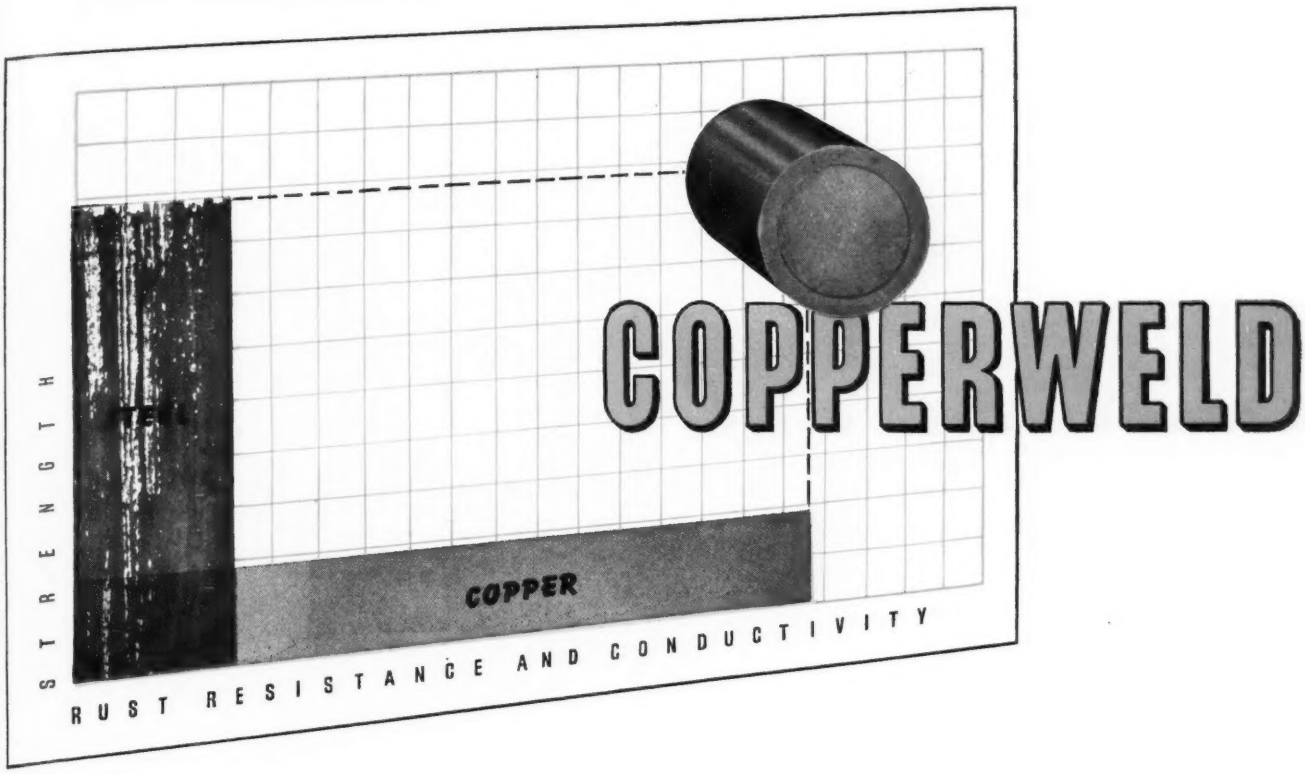
J-97071

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

THE STRENGTH OF STEEL--

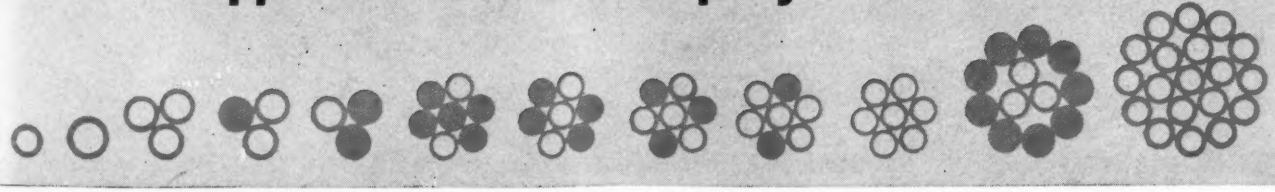
THE CONDUCTIVITY AND PERMANENCE OF COPPER--



It's the combination of copper and steel in Copperweld that makes it the ideal wire for those jobs requiring strength, permanence, and conductivity. Steel provides strength, but lacks rust resistance and electrical conductivity. Copper provides rust resistance and conductivity, but lacks strength. The best characteristics of both metals are united in Copperweld.

A wide range of sizes and types of conductors is available—Copperweld bare solid, Copperweld strand, and Copperweld-Copper strand. From this wide range the engineer can select a conductor to meet practically any requirement of diameter, conductivity, and mechanical strength. And any size or combination that he selects will be permanently non-rusting.

Copperweld Steel Company *GLASSPORT, PA.*



Expanded Facilities To Speed Transformer Deliveries

Additional machinery, a larger corps of trained mechanics, a good supply of raw materials, an earnest desire to meet your requirements—these are among Gardner's facilities available to give you better service.

Subject to WPB orders, standard transformers can be delivered from stock. Special designs can be built quickly to your exact specifications.

Specializing exclusively in transformers, Gardner is prepared to serve you—even under today's trying conditions.

GARDNER ELECTRIC MFG. CO.

4227 Hollis St. Emeryville 8, Calif.

Represented by

MAYDWELL & HARTZELL

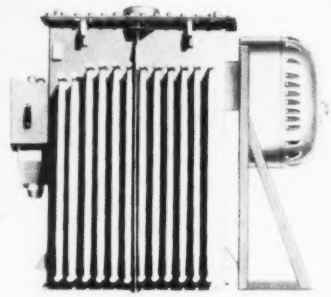
INCORPORATED

SAN FRANCISCO—SEATTLE—LOS ANGELES

Unit Substations (814)

Load center unit substations for semi-hazardous locations, indoors or outdoors, are announced by General Electric Co. These substations are available in standard ratings from 100 to 1,000 kva. at 480 volts and 100 to 500 kva. at 208/120Y or 240 volts for use in power and lighting services of 600 volts and below. Primary voltages from 2.4 kv. can be handled.

A liquid-filled primary disconnecting switch, standard Pyranol or oil-filled transformer section and a low-voltage section with



a 600-volt air circuit breaker are incorporated in the design.

The incoming line switch is mounted integral with the transformer section and is equipped for breaking transformer magnetizing current. A key type interlock working in conjunction with a similar lock on the low-voltage breaker prevents the switch from being operated when load is on the transformer.

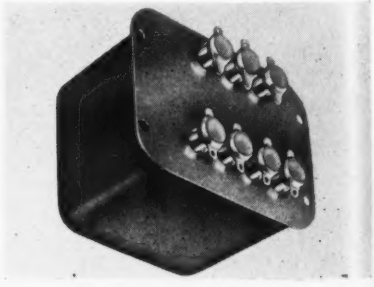
The low-voltage section is furnished with either a manually or an electrically operated main secondary air circuit breaker with time-overcurrent protection and instantaneous short-circuit trip.

Aluminum Nuts (815)

AN conduit, coupling and lock nuts fabricated from sheet aluminum have been developed by the Rumsen Co. The manufacturer claims that these nuts are light weight and as strong as machined nuts and stronger than nuts which have been die cast. Available in sizes -3, -4, -5, -8, -10, -12, -16.

Transformer (816)

Peerless Electrical Products Co. is offering a moisture and dust proof transformer, which is said to meet all Navy and other specifications for hermetic sealing. These transformers use glass or porcelain insulators with metal bands; insulators are soldered into the transformer case. May be produced in desired size or capacity to customer's specifications, the manufacturer states.



THE

"Watch Dog"

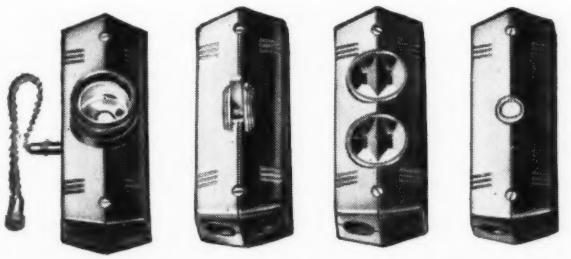
A New G-E FLUORESCENT STARTER

with Rated Long Life

Here is the starter to use for efficient maintenance of fluorescent lamps. It has an average rated life of three years under specified test conditions.

This manual reset starter for 40-watt lamps is called the "Watch Dog." It provides precision starting which helps prolong lamp life and starter life. In addition, it locks out dead lamps quickly and positively thereby eliminating blinking. This action also prolongs the life of the starter.

Moreover, the "Watch Dog" starter enables a dead lamp to be removed immediately. No cooling period is required. It is reset easily to guard a new lamp simply by pressing a button.



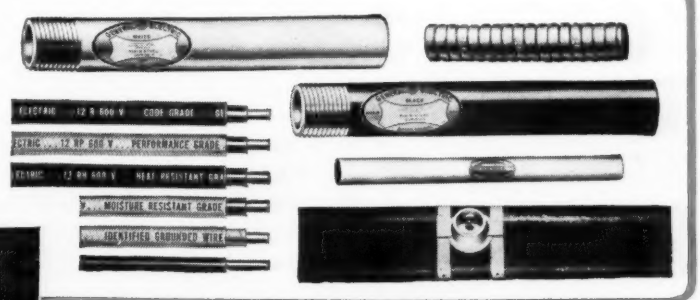
MONCOR SURFACE WIRING DEVICES

These good-looking devices are ideal for surface wiring in war housing and in war-purpose industrial buildings, warehouses, etc. Their use saves time and materials. Knockouts in the ends, sides and backs of these devices enable them to be end-connected, side-connected (knob and tube or cleat wiring) or back-connected for concealed wiring.

FOR FURTHER INFORMATION **about G-E wiring devices, wires and cables and conduits, see the nearest G-E Merchandise Distributor or write to Section CDW-833.18, Appliance and Merchandise Department, General Electric Company, Bridgeport, Conn.**

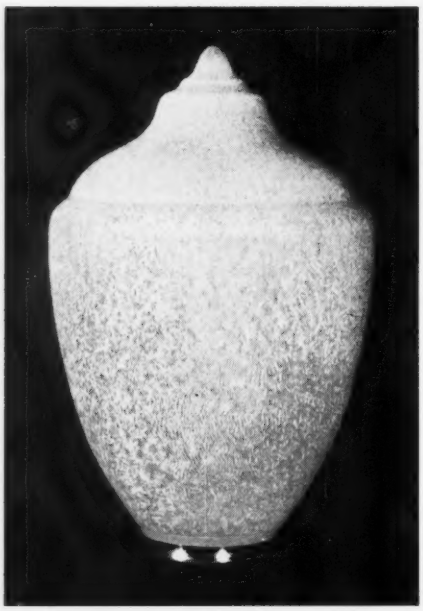
G-E CONDUITS AND BUILDING WIRES

There are G-E conduits and building wires for every purpose: White and Black rigid conduits, EMT, flexible conduit, Fiberduct and six building wires including Type SN small diameter synthetic insulated.



GENERAL ELECTRIC

STREET LIGHTING
Replacement Units
Immediate Shipments



We can supply your needs for street lighting glassware with direct factory shipments from our 21 different sizes and designs which are available to match most systems in use.

Ray-Lite glass is guaranteed to be equal or superior to any glass on the market. The transmission efficiency is 88 to 92%.

All globes are annealed in electrically heated lehrs and are unusually tough and free from internal strains.

Catalogs and prices on request.

RAY LITE GLASS CO.
3172 SANTA ANA STREET
SOUTH GATE, CALIF.

BULLETINS
data books, etc.

Wartime Booklet (817)

A revised wartime edition of the Westinghouse booklet on care and use of electric appliances in the home contains an 18-page section of "first aid" suggestions covering simple repairs. Included are points to check before calling the serviceman; directions for changing a fuse, repairing cords and plugs; common complaints and what may cause them; appliance troubles which the householder can fix himself. The first 27 pages deal with appliance care and use. Vitamized cooking, a vegetable cooking chart, directions for oven meals, correct bulb sizes for portable lamps, how to clean lamp shades, how to remove stains are some of the subjects covered. Safety is stressed throughout.

Vapor Cleaner (818)

Circo Products Co. has prepared a folder on its new Model 35-S Dee Tee vapor cleaner. This unit was designed for the War Department for cleaning and thawing differential, transmission and transfer cases of motor vehicles, according to the manufacturer, and a portable model has been used for internal degreasing of machinery gear cases and enclosed transmissions, oil reservoirs and lines, heat exchangers, etc.

Rectifiers (819)

General Electric has issued a bulletin on its portable sealed-ignitron mercury-arc rectifiers for mining service. These rectifiers and their operation are described, and a chart comparing the performance of this type with that of the motor generator set is included.

Fittings (820)

O. Z. Electrical Mfg. Co. has issued a new catalogue covering its line of conduit fittings, cable terminators, sealing glands, solderless connectors, power connectors and grounding devices. Photo-diagrams show products half in photograph and half in structural line drawing.

Conductors (821)

Crapo steel conductors are described in a 64-page booklet published by Indiana Steel & Wire Co. Contents include electrical characteristics; electrical performance; physical properties; climatic loading; conductor sags and tensions; vibration and fatigue; vertical clearance of wires above ground; ruling spans; construction practices. Illustrated by diagrams and photographs. Included are sag-tension tables and charts and a general loading map.

Radiant Heat Drying (822)

A 12-page booklet on radiant heat drying lamps is being distributed by Westinghouse Electric & Mfg. Co. What radiant heat is, its advantages, speed, costs are discussed. Design and performance characteristics of the drying lamp, design of radiant heat installations, arrangement and spacing of equipment and electrical circuit design are covered. Data is given for the three general classes of industrial applications — evaporation of water or other solvents, paint drying and increasing temperatures of materials to facilitate manufacturing processes. Formulas are given for determining required wattages.

A-C Crane Controller (823)

Cutler-Hammer, Inc. has issued descriptive literature on its a-c crane controller. According to the manufacturer, this controller eliminates need for a mechanical load brake and provides dynamic lowering over five stable speed points, accurate inching for spotting loads and timed acceleration in both directions from a standard five-speed master.

Mercury Lamps (824)

Keese Engineering Co. has issued data sheets on its mercury lamps for use with refractometers and for inspection of optical lenses and flats.

Sound Frequency Analyzer (825)

Western Electric Co. has issued a folder giving information about its sound frequency analyzer. According to the manufacturer, this analyzer will simultaneously measure and record frequencies over a wide range.

ELECTRICAL WEST, 68 Post St., San Francisco, California

Please send me information about following CIRCLED items:

800	801	802	803	804	805	806	807	808	809
810	811	812	813	814	815	816	817	818	819
820	821	822	823	824	825				

Name..... Company*..... Title*.....

Address.....

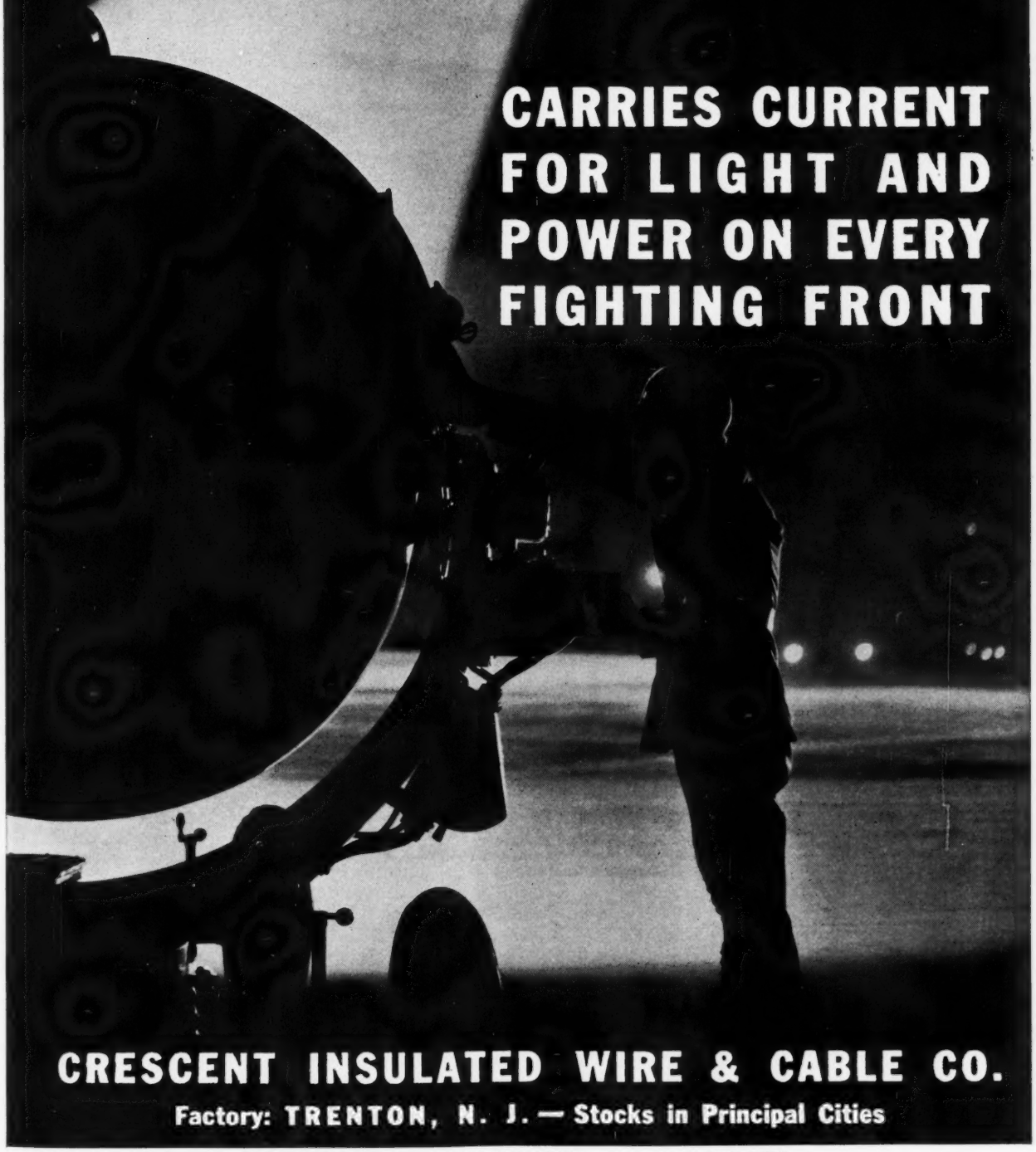
* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

VARNISHED CAMBRIC . RUBBER POWER CABLES . BUILDING WIRE . RADIO WIRES . SIGNAL CABLE . FLEXIBLE CORDS . LEAD-ENCASED AND PARKWAY CABLES . ARMORED CABLE

CRESFLEX NON-METALLIC SHEATHED CABLE . SERVICE ENTRANCE CABLE . MAGNET WIRE . BARE WIRE

CRESCENT
WIRE AND CABLE

CARRIES CURRENT FOR LIGHT AND POWER ON EVERY FIGHTING FRONT



CRESCENT INSULATED WIRE & CABLE CO.

Factory: TRENTON, N. J. — Stocks in Principal Cities

LOS ANGELES
Tri-State Supply Corp.
544 S. San Pedro St.

SAN FRANCISCO
Tri-State Supply Corp.
554 Bryant St.

KANSAS CITY
W. F. Howe & Co.,
2627 McGee St.

CRESCENT ENDURITE SUPER-AGING INSULATION . WEATHER-PROOF WIRE

ELECTRA'S HUSBAND

This Renegotiation Business

ELECTRA is on her vacation. Maybe it's a good thing. She'd only clutter up this discussion (she'll likely slap me down for that remark). Anyhow, she doesn't know anything about renegotiation and probably never would unless a fatal accident removed the lesser half.

This renegotiation business becomes important to a lot of people now that it has been extended to sub-contractors. That means almost anyone is likely to get "the works." So there is a real advantage in knowing the typical procedure. We found a man in the electrical business who had been put through the mill. Out of the goodness of his heart he proffers some comments:

THE APPROACH: First comes a letter from the War Department asking for a rough breakdown of 1942 sales over the major services—prime and sub-contract.

2. Another letter assigns you to the service showing the highest percentage of sales.

3. A phone call from a very nice gentleman apologetically asks for some data. He says he'll mail you a list of the things he wants to know.

4. There is another phone call from another gentleman asking if he and a CPA can come out and ask some more questions. These are the boys that handle the scalpels.

5. It may take a couple of weeks for them to boil it all down. Then you are invited into The Room and told.

6. Unless the shock brings to light some highly extenuating circumstances that you forgot originally—that's IT. They are still listening even then, but frankly, you've got to be good to change IT.

THE FORMULA: First, all discussions and calculations are before taxes. That's important.

2. Eliminating any losing years from your average sales, take the remaining average sales and average profit, for the four tax base years—1936 to 1939 inclusive—and determine the average percentage profit.

3. Subtract them from your renegotiable sales and profits due to those sales respectively.

4. Figure a return on the balance of renegotiable sales after (3) above which is somewhat less than the average percentage set up in (2).

5. Add the profit from (2) to the return from (4) and the profit from the non-renegotiable sales.

6. Subtract the sum in (5) from what you actually made and make suitable arrangements.

THE HUMAN SIDE: First and foremost, you will meet some highly competent and courteous business men.

2. Any variations in the formula will be determined by all the oddments about your business that you pass on to them.

3. Practically speaking, there is no appeal from their decision, and they emphasize that they are not giving you trading figures.

BOOK WORK: The renegotiable period under the law starts on April 28, 1942. However, they will negotiate contracts let prior to that date, any part of which was not paid on April 28.

2. You must be able to segregate non-renegotiable sales on your books and prove them. You just can't guess.

3. You must be able to prove your profit on renegotiable and non-renegotiable sales as separate items.

4. You will be asked to submit detailed balance sheets and P&L statements from 1936 through 1942.

5. You will be asked to submit a list of service contracts and subcontracts by dollars along with the originating service contract number.

6. You will be asked to write about your company, its history, its troubles and its accomplishments.

7. Don't worry, you'll be called.

AS might have been expected Electra read the above. Her remarks about being renegotiated won't bear repetition. But she did dig up a copy of a letter from a shop owner in one of our interior Coast cities, asking:

"Why didn't your friends write a letter like this one?" Here it is:

"In answer to your letter regarding availability of our shop facilities for contemplated work on the ———, I will have to answer that this depends on circumstances.

"If we can secure business on the basis of a simple purchase order which states in words of one syllable that we are to get a definite amount per pound, per ton or per piece, on completion of the work and can be furnished with correct drawings and specifications which are not subject to daily revision or reinterpretation with each changing phase of the moon, we might find some available facilities. We definitely, however, do not wish to endure the pangs of wading through a 37-page contract, drawn by a legal expert in verbosity and filled with evasion, circumlocution and equivocation.

"In the first place, the trick verbiage in small type strains our bifocals, and our I. Q. being measured in terms of quadrillions of light years preceded by a minus sign, we are not equal to grasping all of the fatal significance therein incorporated. Our development is strongest in the biceps and the submaxillary jaw. In fact so much material was used at the wrong end in forming our pedal extremities that the necessary kilograms were absent when the matter of cranial furnishings was arrived at. Further, we suspect that the convolutions of our cerebellum are approximately on a par with those of the Neanderthal man. After the legal department has worked its wicked will, apparently they call in etomologists, philologists, psychoanalysts and numerologists, in fact everything but philanthropists, who intersperse and inoculate it with further hypodermics of verbal hokum that would baffle the intellectual genius of Einstein.

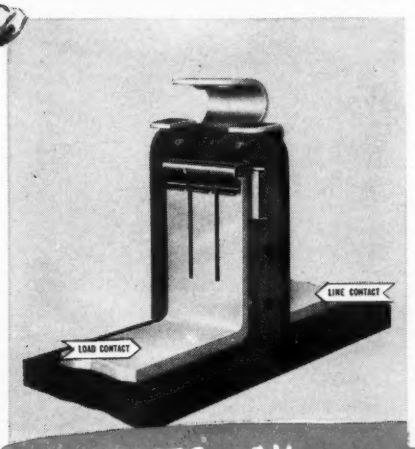
"From there we are turned over to the tender mercies of inspectors, x-ray experts, auditors, super-auditors and experts on sophistry and syllogistic arguments, all leading to a reduction in the net proceeds of the contract to the vanishing point or less.

"I have already had shingles, hives, rheumatism, broken bones and suffered various sorts of cuts, bruises, abrasions and contusions with aggravated complications, and under all the bludgeonings of fate, have stood with head bloody but unbowed. But even if I had the nerve system of one of the invertebrates of the preglacial age, could not stand for any more of the renegotiated form of contract. I would rather spend my declining years cultivating that lowly but popular product of the tuber family commonly designated as the Murphy. . . . I suggest that on your next contract you use for a crest a hangman's noose and within the loop, the words: 'All Ye Who Enter Here Leave Hope Behind.'"

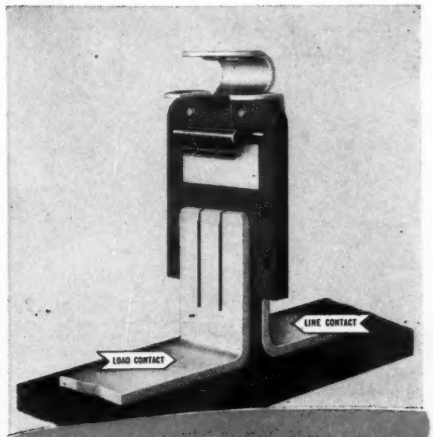
WHY Vacu-Break SAFETY SWITCHES?

Here's Why —

PARTIAL VACUUM quickly smothers arcs



CONTACTS (IN ON POSITION) tight as a bolted connection



CONTACTS MAKE AND BREAK with automatic ease

PUSH-TYPE, FRONT-OPERATED rocker handles enhance the fine effect of streamlined switch cabinets.

In the three illustrations above, a switch head has been cut away or removed to show the design and action of the Vacu-Break Clampmatic principle.

BullDog's Clampmatic Vacu-Break design combines in a simple construction the two features most essential to flawless safety switch performance—*clamp-tight contacts* and *easy operation.*

It is worth remembering that BullDog—with all its advantages of simplicity, fine appearance and positive action—costs no more than switches *without* this thoroughly modern design.

Ask your BullDog field engineer to give you his interesting mechanical demonstration of the Clampmatic Vacu-Break principle.

BULLDOG
ELECTRIC PRODUCTS CO.
Detroit, Michigan

MANUFACTURERS OF a complete line of Vacu-Break Safety Switches, Panelboards, Switchboards, Circuit Master Circuit Breakers and BUStribution SYSTEMS.

BullDog Electric Products of Canada, Ltd., Toronto, Ontario Field Engineering Offices in All Principal Cities

For a bright future
BUY MORE WAR BONDS

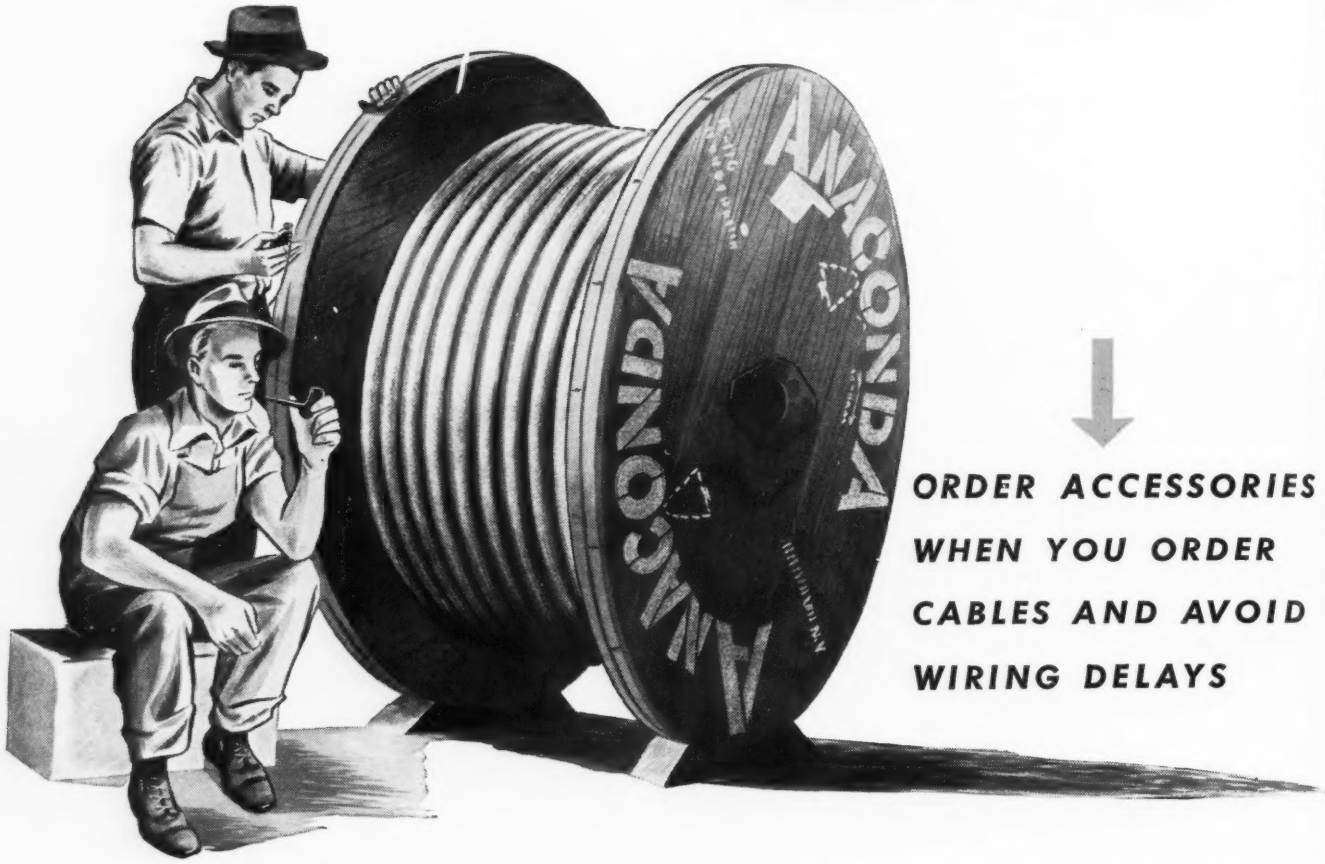
BULLDOG PRODUCTS ARE SOLD AND DISTRIBUTED BY THE FOLLOWING PACIFIC COAST REPRESENTATIVES:

Coast Electric & Manufacturing Co.
1720 N.E. Sixth Avenue
Portland, Oregon, Tel. Garfield 2844

Safety Switchboard & Manufacturing Co.
1445 Stevenson St.
San Francisco, Calif., Tel. Hemlock 2470

Mullenbach Electrical Manufacturing Co.
2300 East 27th Street
Los Angeles, Calif., Tel. Jefferson 2224

War Time is Priceless!



ORDER ACCESSORIES WHEN YOU ORDER CABLES AND AVOID WIRING DELAYS

EVEN before the war, the common practice of waiting to order cable accessories until the cable for the job had been shipped frequently caused days of delay.

Today, however, it may even take a month or more before an accessories order can be approved and materials started on their way.

This holds up the wiring job unnecessarily. In the meantime, workers may be idle—and not just electricians alone, for other workers all along the line may be affected. Today, if never before, follow this wartime-saving practice:

1. Order accessories and cable at the same time —for delivery together.
2. When ordering unit package jointing material, include your order for terminals and potheads. If buried cables, remember joint boxes. 43232

Every Anaconda unit package contains instructions and all materials required for the particular job. When ordering, please specify number of unit packages needed, operating voltage, size, number and shape of conductors, thickness and kind of insulation, thickness of lead sheath of cable.

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Management
—Heart of America's Industrial Progress

In Peace and War, Management Men and Methods Steer Production on a Steady Upward Course

WHEN the Allied armada of 2,000 ships, protected by a vast umbrella of planes, struck the coast of Sicily, Axis leaders once more had reason to wonder how "that decadent, pleasure-loving America" had swung from the manufacture of automobiles, refrigerators and costume jewelry to equipments of war, and had out-produced such mighty plants as the Krupp, the Fiat and the Skoda works — and had done it so quickly.

America at war is in the lead just as it has led a world at peace. Super-performing planes are taking to the air at the present rate of nearly 100,000 per year. Ships, to carry the war to our enemies, slide down the ways at the rate of two a day. Tanks, trucks, guns, ammunition are pouring out of our "peace" plants in far greater volume than the entire Axis effort can possibly equal. War expenditures in 1943 alone will reach the staggering figure of approximately $83,000,000,000 — an amount equal to our entire national income for 1929. Added to this is the rock-bottom output of essential civilian goods — a very considerable item.

This unprecedented production is taking place while some 9,000,000 men and women, those physically best equipped, have been called to the armed forces. Many of them were taken from industry, and their loss could be repaired only by more efficient equipment and more effective methods.

Rigorous training programs had to be superimposed upon many other abnormal problems facing industry in its high-speed conversion from stoves to boats; from printing machines to guns; from automobiles to airplane engines; from fishing tackle to bomb sights.

This phenomenal task was further complicated by the need for rapid expansion. A modest machine tool industry had to be expanded to handle a volume many times its normal capacity. Steel production had to be increased by 20%, and that of aluminum and magnesium multiplied over and over. From almost nil, the demand for high octane gasoline soared to unbelievable quantities. The creation of synthetic rubber and electronic industries was necessary almost overnight.

Who deserves credit for these accomplishments? All industry! The engineers, chemists, designers, skilled workers, common laborers. But over and above all it belongs to *management*.

In industry it is mandatory to have a directive force to co-ordinate the efforts of men in the use of materials and the application of power toward the production of goods and services. The application of this directive force is the function of management, and only because we had today's kind of management were we able to transform ourselves, almost overnight, from a peace-loving nation to the world's greatest producer of implements of war. As a nation, we had been preparing for a long time to play our part in world affairs. This preparation, certainly not planned for today's objectives but none the less effective, began some four decades ago.

With the advent of the twentieth century, the character of industry in the United States, and, therefore, the character of American living, began to change. Scientific management was born. Frederick W. Taylor brought into focus and showed how to use effectively those processes and procedures upon which our present-day mass production is based. He was followed by Harrington Emerson, who made the industrial world acquainted with efficiency in manufacture and the remarkable progress to be gained therefrom in the field of production, with its consequent price reductions and wider distribution of industry's products. There followed, in industry, an alert management, a capable management, a management with vision. Without it, the work of Taylor and Emerson would have gone for naught.

It is because of this early work of management — and the extraordinary developments it produced — that the country as a whole, and particularly those employed in industry, were not over-awed by the seemingly impossible job of quick conversion to all-out war production. But let us look back four decades and examine some of those preparatory accomplishments which have proven so vital to the progress and welfare of the nation.

From 1900 to 1939 (the last pre-war year), total employment of all kinds increased 52 per cent; in the manufacturing industries alone the increase was 84 per cent. *The nation became definitely industrial.*

In 1900 the average wage earner was able to spend only 20.2 per cent of his income for things other than necessities; in 1930 his buying power for non-essentials had increased to 34.8 per cent. *The average man acquired confidence in what industry could do.*

In 1900 the average work week was 56 hours; in 1930 it was 48 hours. *The burden of production was being transferred from man to machine.*

In 1939 the United States possessed 30 per cent of the world's railroads, 72 per cent of its automobiles, 49 per cent of its telephones. *The nation's production equipment had grown to formidable proportions.*

In 1939 nearly half of the families in the United States owned their own homes, 64 million individuals carried life insurance policies and 45 million had savings accounts. National income had increased 300 per cent from 1900 and during the same period the proportion of national income paid out in salaries and wages increased from 58 to 70 per cent. And in less than this period (1914–1939) the purchasing power of the wage rate increased by 60 per cent. *There had been evolved the kind of living for which men will work — and fight.*

Since 1900, factories increased their output of goods from $11,000,000,000 to $60,000,000,000 in 1939. This increase of nearly 450 per cent was accomplished while the country's population rose only 60 per cent. In this same span of years, technological developments and improvements in methods had

increased the value added by manufacture per wage earner by 200 per cent, and the horsepower per factory worker had been multiplied by 2½. *The nation's production plant was ready to assume its gigantic wartime job.*

During this period of industrial and national evolution, management itself had changed. Prior to the advent of scientific management, our goods and services were the product of several kinds of directive activities, varying from the strictly paternalistic to the ruthless. There was little conception of the responsibility that industry now broadly acknowledges — the responsibility of trusteeship in the interest of stockholders, employees and the public — specifically; in the interest of our national economy — generally. Acceptance of this stewardship is acceptance, also, of the belief that, in the long run, no industry, and no unit of industry, that does not serve society can live.

Have the actions of management caused the times to change? Or has an alert management been successful only because it has changed with the times? Certainly, the industrial concern of 1900 would not thrive under the conditions of today. Just as certainly the new things that industry has in store for a waiting postwar world will have a far-reaching effect upon the times.

Management today seldom owns the factory or the business it manages. It is hired to perform the coordinating, directive functions. It is free to change — of itself, or with the times. Management therefore exercises its power through leadership in executing ideas . . . not through ownership.

This is the fourteenth of a series of editorials appearing monthly in all McGraw-Hill publications, reaching more than one and one-half million readers. They are dedicated to the purpose of telling the part that each industry is playing in the war effort and of informing the public on the magnificent war-production accomplishments of America's industries.

Good management can be sustained only in an environment sympathetic to its aims. It has an undeniable obligation to society, because it must be a compatible part of the social structure or be rejected by that structure as a whole.

An environment sympathetic to its aims means, also, that industry, in the very serious reconstruction period ahead, will not be at full effectiveness if it is subjected to attacks by government no matter what the underlying reasons may be — over-zealous devotion to a cause, lack of understanding or just plain politics. It was to industry — to industrial management — that the government turned when our existence as a free nation was threatened; it is to industrial management that government must turn in order to win the peace.

This statement is made in the sincere conviction that what has made America strong is industry's ability to produce consistently more and more goods and services for more and more people. It is only by actually creating them that we built up our stockpiles of the necessities of life. And it is only by creating them that we can have more of those things that make life worth while. These become available to more people as industry succeeds in getting greater output of goods and services for a given input of human energy, materials and power.

And what of the physical jobs ahead? In this country alone, there will be an immense demand upon industry to supply the things people have been unable to purchase during the war. Today the nation is wearing out not only its automobiles, refrigerators, vacuum cleaners and radios, but its very houses, its roads, railroads, and airline equipment. It is saving its money while whetting its appetite. Truly, the calls the American people will make upon industry in the postwar period will be many and insistent.

This demand can be viewed in another light. Economists say there will be 56,000,000 persons seeking gainful employment after the war. The Committee for Economic Development has estimated that $140,000,000,000 worth of goods and services will be required each year for those people. Compare that with our actual output of $97,000,000,000 worth of goods and services in 1940 when gainful employment was 46,000,000.

These future jobs will be done if industry's management is not too much hampered by government management. Management in industry performs its function in the field of *doing* things. Management in government performs its function in the field of *regulating* things. The best cooperation of the two kinds of management will be necessary in the postwar period. Certainly, too much of the regulatory kind will interfere seriously with the kind that does things.

Industrial management must improve, too. If it is too selfish, if it does not recognize definitely the trusteeship inherent in its job, if it does not understand and live up to its social responsibilities, then it will be risking all for which we are fighting. The following suggestions are made to indicate the direction that management's self-improvement can take.

Evolution in management has been too slow in some respects. Management in industry has been too prone to see the advantages in technological development while being blind to its evils. Looking at industry and social progress as a whole, there can be no doubt as to the value of technological improvement. It creates jobs. It elevates the standard of living. But that economic fact is of no satisfaction to the individual who loses his job because a new machine or a new method required one less man. By and large, this is an evil that management can do something about.

Management has been too careless of its opportunities with regard to labor. On that account the pendulum of social readjustment has swung too far. Labor has been given extensive privilege without corresponding responsibility.

Industrial management has been too slow to abandon its policy of letting the buyer beware. As a result of this, industry today is over-regulated.

Management has been too slow in recognizing its responsibility to promote the economic philosophy that a society cannot have for consumption what it does not produce. A companion educational item too long neglected is management's obligation in the field of public relations.

In these years since 1900, industrial management has been growing. Perhaps many of its experiences have been but growing pains. Management has learned, among other things, the absolutely vital need for capital at the right time and in the right amount. It has learned to use some of its earnings as "seed-money" in the introduction of new products and the use of new processes. It has learned to invest more and more in research. It has learned of the interdependence of industry and agriculture. And it has learned much about the eternal triangle of industry, labor and government.

With such a history and such experiences behind it, I have every faith that management is going ahead to even more glorious accomplishments in the winning of the war, and I believe that its peacetime accomplishments to come are beyond the prediction of any of us — even management itself.

President, McGraw-Hill Publishing Company, Inc.

Demand for FRIGIDAIRE Wartime Suggestions booklet passes the 5 million mark!

Buy War Bonds for Victory
Save food, flavor, money too!
FRIGIDAIRE
gives these timely suggestions to help you fight food waste
SAVE ends of cheese near rind. Grate and store in covered jars for use in casserole dishes.
SAVE uncooked egg whites in tightly covered jar for use in meringues, frostings, etc.
SAVE fat drippings for home use or fat salvage. Refrigerate bacon grease or drippings.
SAVE unused vegetable juices for soups, etc.—fruit juices and syrups for desserts, drinks.
SAVE the vitamin values of leftover vegetables by using them uncooked in salads.
SAVE the good in leftover cooked meat by storing in a covered dish. Prevents drying
Before the war only your pocketbook suffered if you tossed away a withered vegetable, a dry chop, or a dab of leftover cooked food. But now food waste also hurts the nation's war effort and robs the family table!
No one wastes food deliberately. But losses do occur! Sometimes through improper food storage. Or failure to use every drop and crumb. Knowing the best ways to use your refrigerator helps you minimize waste, save precious points. Check the food-saving ideas on this page. You're an unusual woman if you know them all!
Fresh Meat, if not to be frozen, keeps best in meat or defrosting tray. Cover lightly with waxed paper. Leave ends open for free air circulation. Do not cut or chop meat until cooking time—keeps better in the piece. Wrap and freeze ground and variety meats if not to be used day of purchase.
Eggs left at room temperature for 3 days lose as much freshness as in 2 months in refrigerator! Never wash eggs before storing, it destroys a protective film that guards freshness. Cool milk and egg dishes like custards in pan of ice water, then cover and refrigerate until serving time.
Milk should never be left in sunlight or at room temperature. Refrigerate immediately, continuously. Never pour milk or cream back in bottle. CHEESE should be wrapped in waxed paper to prevent drying. Keep soft types covered, use promptly. BUTTER needs tight cover to protect flavor.
Soft Fruits and Berries should be sorted, spread out on shallow pan or plate, and refrigerated. To guard against mold, do not cover. Handle carefully, any break in skin helps hasten spoilage. As a further precaution against mold, never wash berries until just before using.
Fresh Vegetables lose their vitamin content rapidly at room temperature. Wash and drain them immediately after marketing and store in covered container in refrigerator. Pile them loosely to prevent bruising, quick spoiling. Save usable trimmed outer leaves for use in soups.
Melons, when ripe, need refrigeration. Until then, keep them dry to prevent mold—at room temperature to improve taste and texture. Handle gently to avoid bruises. When chilling, cover cut ends with waxed paper. Wrap cantaloupes well to guard other foods from strong odors.
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Peacetime Builders of Home Appliances, Commercial Refrigeration, Air Conditioners

"Public anxious for this kind of information"

"600 requests from one radio announcement"

"Entire supply of booklets exhausted in two days"

"Gave away 1300 booklets Saturday"

"Building more genuine customer appreciation than anything we have had in 18 years"

THESE typical field reports give you an idea of the extraordinary dealer and public interest in the Frigidaire campaign. The entire program is a tremendous success!

Dealers are enthusiastic as they witness public reaction to national advertising and local promotions built around the WARTIME SUGGESTIONS Booklet. All types of dealers from all parts of the country are writing in to tell how they are capitalizing on this real opportunity to build good will in their communities by rendering a genuinely helpful service to present and potential customers.

To date public and dealer demands for WARTIME SUGGESTIONS Booklets have exceeded 5 million copies, and this figure is steadily growing as an ever increasing number of dealer activities get under way.

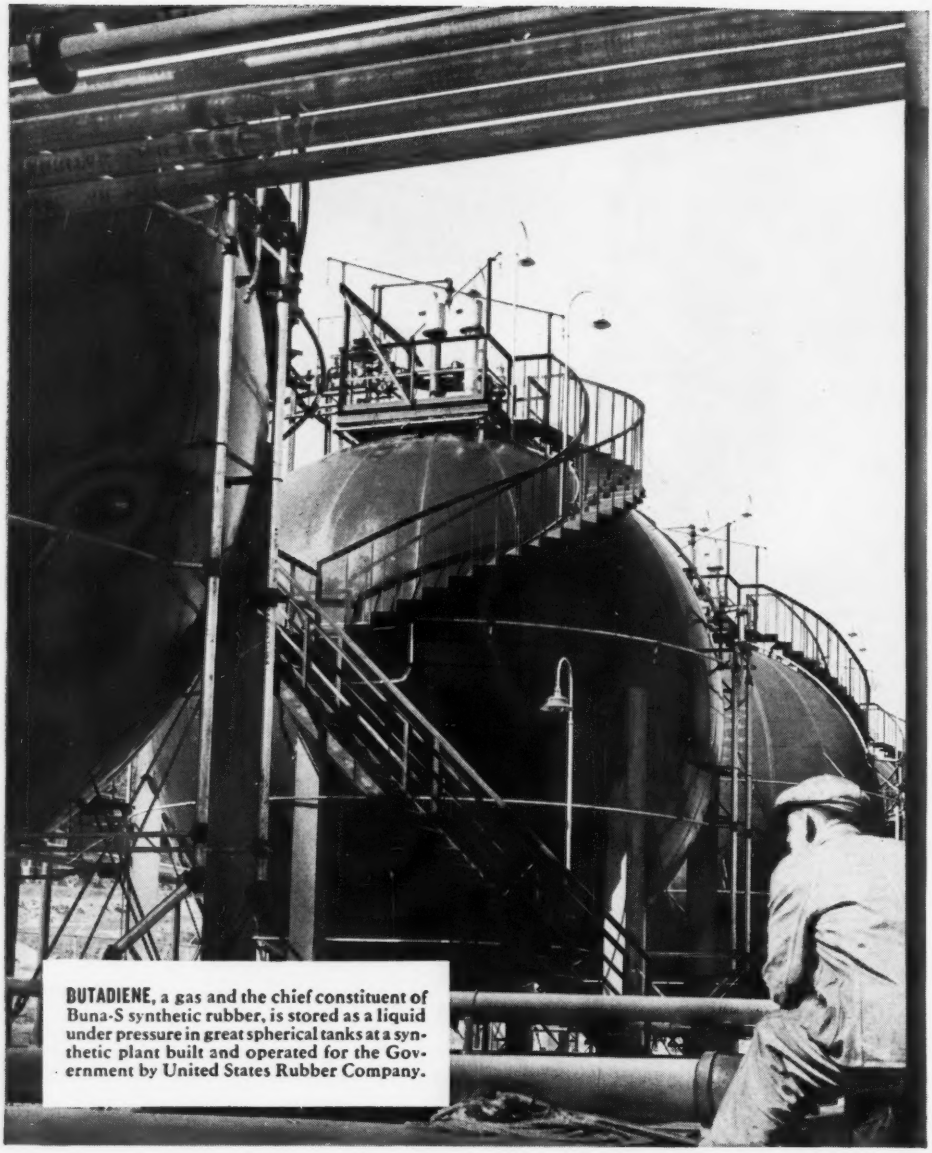
Here's a campaign that speaks the dealer's language

. . . for it talks about refrigeration—the dealer's business. The above ad, 5th in a series, will appear in full color during July and August in Life, Ladies' Home Journal, Woman's Home Companion, Good Housekeeping, and McCall's, and in 2 colors in Better Homes & Gardens, American Home, True Story, and Farm Journal and Farmer's Wife.

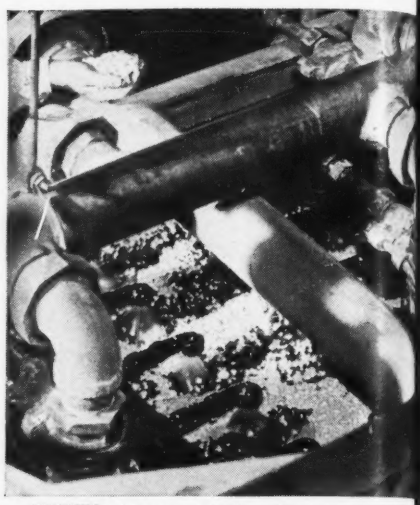
For Excellence in War Production

FRIGIDAIRE Division of GENERAL MOTORS

Peacetime builders of Home Appliances, Commercial Refrigeration, Air Conditioners

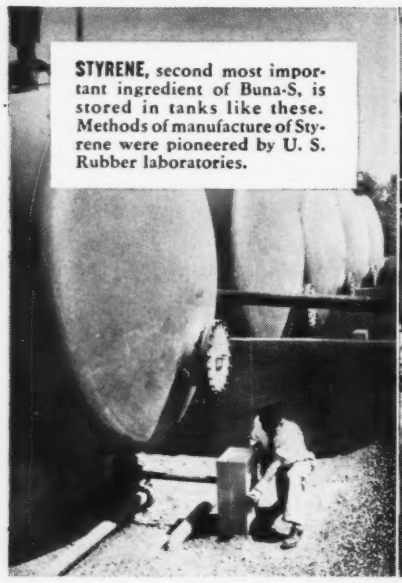


BUTADIENE, a gas and the chief constituent of Buna-S synthetic rubber, is stored as a liquid under pressure in great spherical tanks at a synthetic plant built and operated for the Government by United States Rubber Company.

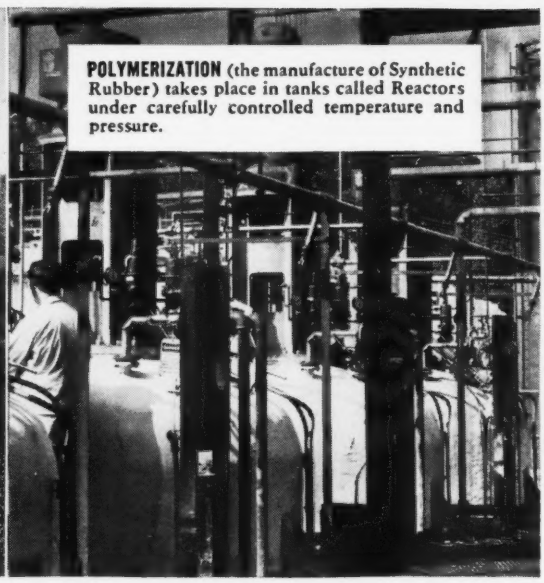


WASHING. After coagulation, flocs or crumbs of synthetic rubber, looking like popcorn, are washed to remove chemicals.

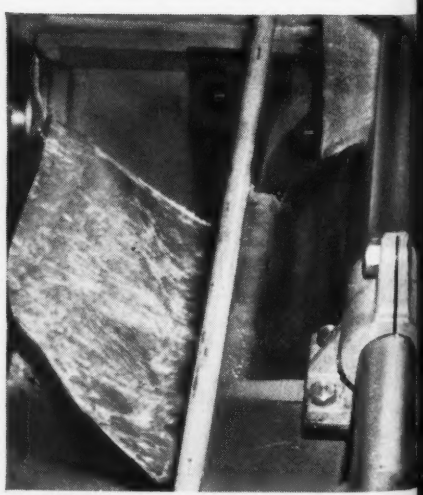
TUBING—that looks very much like a butcher's meat grinder—squeezes synthetic rubber into strings and removes excess water before the synthetic goes to the driers for further processing.



STYRENE, second most important ingredient of Buna-S, is stored in tanks like these. Methods of manufacture of Styrene were pioneered by U. S. Rubber laboratories.



POLYMERIZATION (the manufacture of Synthetic Rubber) takes place in tanks called Reactors under carefully controlled temperature and pressure.



FINISHING of synthetic rubber includes milling to proper plasticity and uniformity. Here you see synthetic rubber leaving the finishing mill in the form of a sheet ready to be baled for shipment.

UNITED STATES

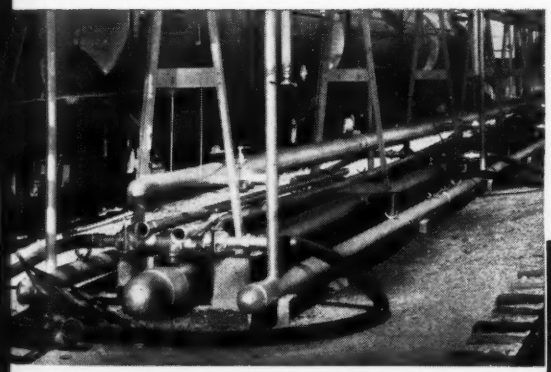
WHAT IS SYNTHETIC RUBBER?

Synthetic rubber can be made from gasoline, coal, alcohol and gases kept liquid under pressure. This means that a synthetic rubber plant is made up of hundreds of miles of pipe, acres of tanks and more acres of giant-sized chemical retorts or reactors.

Manufacturing synthetic rubber is a process requiring vast and special equipment. Each of the five basic commercial types is produced in virtually the same way ...by hooking little molecules together to form increasingly larger ones. But...because each of the basic synthetic rubbers is capable of myriads of variations...it is what is done to the synthetic rubber after it is produced that really counts. It must be processed. Reagents and catalysts must be added to it. It must be specifically compounded for the specific task. United States Rubber Company pioneered in developing many of the major processes used in fitting synthetic rubber for the jobs it must handle.

This is rubber chemistry...and United States Rubber Company is the largest manufacturer of rubber chemicals in the world. Throughout our hundred years' history, we have worked with rubber, improved it, broadened its uses. We pioneered in the production of conductive rubber, cellular rubber...a score of other revolutionary advances in rubber manufacturing.

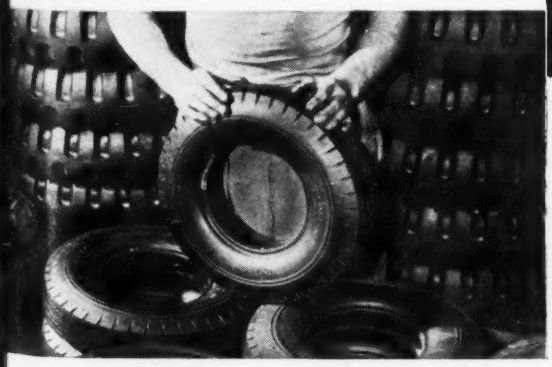
It is only natural that we have built up a tremendous backlog of knowledge and experience in processing rubber to handle a certain definite job. Today, this fund of knowledge of rubber chemistry is being drawn upon to the fullest in our work with synthetic rubber to supply the Armed Forces and war industries with the synthetic rubber and synthetic rubber products they need.



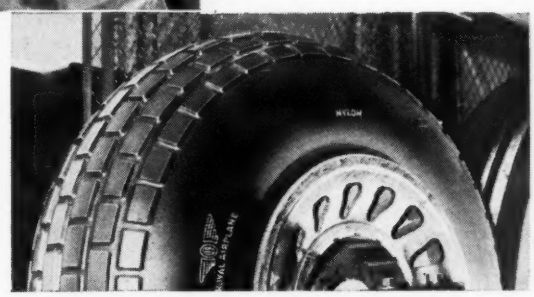
SYNTHETIC RUBBER HOSE for fuel has been made commercially by U. S. Rubber since 1931. Synthetic rubber has marked superiority to natural rubber in its resistance to deterioration due to oil or gasoline. Synthetic rubber hose plays an important part in speeding the shipment of vital fuels.

RUBBER PONTONS for the Army Engineers are made with synthetic rubber. They are used not only as supports for temporary, floating bridges, but also as ferries for transporting men and equipment to establish a bridgehead. After use they can be deflated, repacked into small cases and trucked away for repeated service.

CONDUCTIVE RUBBER TUB LINERS are used in munitions plants for handling highly explosive materials like T. N. T. They are an important safety factor because they prevent mechanical as well as electrical sparks and dissipate static electricity before it can cause a serious explosion. This is another war job being handled efficiently by synthetic rubber.



SYNTHETIC RUBBER TIRES for the Armed Forces and industrial uses combine latest developments of the chemistry of rubber and textile manufacture. U. S. Royal Airplane Tires with treads made of synthetic rubber and bodies built of synthetic fiber are proving that they can take the shock of giant bomber landings.



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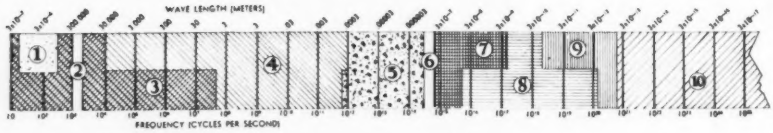

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ELECTRICAL WEST

AUGUST, 1943
VOL. 91 NO. 2

All Must Strive for the Preservation of FREE COMPETITIVE ENTERPRISE

The more Americans who work, the harder they work, the more efficiently they work, and the more and better tools they use, the more goods and services we all, as free Americans, will have

Leonard E. Read*

General Manager, Los Angeles Chamber of Commerce

WHAT is free competitive enterprise? Certainly it is easier to say what it is not than what it is. But this much can be said:

Free enterprise means freedom for every individual to exert his utmost capacity in producing those commodities and services which a people needs.

It means equal opportunity and freedom for every worker to choose where he will work and what he will do without asking the consent of any bureaucrat or paying tribute to any vested interest.

It means a system of rewards, profits and losses, arrived at through voluntary agreement in competitive markets.

It means protection by law and public opinion against predation, fraud and violence.

It means good sportsmanship on the part of participants, who will try to win by superior efficiency and service, not by racketeering, political favoritism, or monopolistic combinations.

It is men and women working out their common destiny, not under the lash of coercive authority, but under the discipline of enlightened self-interest and moral responsibility.

Free competitive enterprise will put everyone capable of honest effort to work. It will put all of us to work because increased production will reflect itself in lower and lower prices bringing products and services within ever lower ranges of purchasing power, thereby requiring still more production. It will put an end to increased production reflecting itself in sterilized surpluses decaying in storage. Price rigidities, extravagance theories and restrictive rules which cause this condition have no part in this system.

Free enterprise is also the one way to get the new products, new services and new industries which create new jobs and open new opportunities for the creative genius for all the people.

Free competitive enterprise is the only means of ending the paradox of impoverishment amid plenty.

Free competitive enterprise is the only hope we have of extricating ourselves honorably from the astronomical debt we shall have when this war is over. It is the only hope because all wealth has to come from production and this is the way, the only way, to get full production.

While the enterprise system will make expanding business it is also the only sound method labor has of increasing real wages, that is, affording more goods and services for a day's work. And to those labor leaders who say that management is a matter of no difficulty, that labor can run the industrial works, we say free competitive enterprise offers the answer. Not cynically, but sincerely, we say let those in labor start new enterprises and show the country better ways to do things. This is the way at least of those who ask no special privilege but only equality of opportunity.

Business, under free competitive enterprise, is no particular frozen group of people or corporations. Instead, it is a condition, or an aspect, of enterprising life into which people from all classes come and go, fail and succeed, according to their ability, their self-disciplines, their ambitions, their initiative.

To those who say free enterprise has failed, I reply, it has never failed. When failure has come to nations, it has not been because of freedom, but because of the lack or perversion of it. Those periods in human history in which productive enterprise has been most free have always been the periods of most rapid progress in abolishing want and in raising standards of human welfare.

Specifically, what ought you and I and our associates to do in the way of planning for the attainment of free competitive enterprise? Some suggestions, not complete by any means, but suggestive of the course or action we must take and also suggestive of the magnitude of our task, are contained in the accompanying tabulation.

We must prepare ourselves for some such program or forget the attainment of free competitive enterprise—of freedom itself.

Never in the history of America has there been a greater challenge or a more difficult task before us.

A working economy is what we seek—one that will encourage work and that will insure to us the just rewards of our work. That economy is free competitive enterprise.

Let us learn for ourselves the rules of clean competition in a free society. Let us learn to do business in the spirit of sportsmanship which welcomes strenuous rivalry. Then let us crusade for the principles of free competitive enterprise that they may be the guide

* Extracts from an address before the Pacific Division, National Electrical Wholesalers Association, Santa Barbara, Calif.

for all men who love freedom, who are willing to accept its responsibilities and who want to share in its opportunities.

Los Angeles Experiment

One current effort toward this end is the experiment in self education undertaken by a group of Los Angeles business men, with the object of finding a sound working economy as an alternative to the present "bungling" system. It was with the admission that business men have no monopoly on purity of economic thinking and a sense of their obligation to offer constructive ideas that the group began the experiment.

The plan is simple. The men meet in different groups, each group once a week. A business leader presides. An economist, selected for his broad understanding and courage, lectures on some phase of free competitive enterprise. In the discussion which follows, frankness is insisted upon; monopolistic or anti-enterprise practices are aired, regardless of who is present.

Interest in the program is growing and understanding is developing. Hidebound and erroneous views are being changed. Crusaders for a free America are being born again. Perhaps the plan will catch on in other communities; if so free competitve enterprise will be a reality in postwar America.

To Preserve the American Free Enterprise System

HERE are seventeen steps some or all of which each of us, as business people or individual citizens, can take:

1 Start right now at the grubby and difficult task of mastering the principles of free competitive enterprise. We should learn to expose the fallacies of socialism, NRA Capitalism and the like and prepare the adjustments in our own affairs that free competitive enterprise will demand. These are not small adjustments.

2 Plan how, in the conduct of the war, to assure ourselves that war controls will be temporary in nature and that none of them will remain as permanent features of our peacetime economy.

3 Plan the transition from war to peace and from the superstate to a free economy. Government, by reason of the militaristic role it has had to play and by reason of the paternalistic role it has aimed to play, must be composed of men who will see that the job is conducted in such a way as to insure the strongest incentives for private as distinguished from governmental employments.

4 Plan how to manage the huge postwar debt so as to minimize its potentially disastrous inflationary effects—a task about which few people know anything but about which they must know much.

5 Plan reduction in the expenses and personnel of governments—federal, state and local—to supportable proportions.

6 Plan a revision of the tax structure to reduce the load on the tools of essential production.

7 Plan a revision of existing statutes to insure against price-fixing, production restrictions, agricultural parities, labor monopolies, featherbed practices and trade barriers. In short, plan the basis for increased production and technological advances reflecting themselves in lower prices and therefore in benefits to society generally.

8 Plan how to abrogate those international commitments which would require our federal government to control domestic production and distribution, thus making freedom in enterprise impossible.

9 Plan an appreciation by the American public that mere employment, regardless of its productiveness, and that national income, irrespective of what composes it, are meaningless and without significance to general economic welfare.

10 Plan public works which by reason of their utility will yield a net gain to the productive and distributive processes and therefore a tangible value to the people as consumers—only works which are not possible by private endeavor.

11 Plan how to expose the fallacies of public works of the "nice-if-we-could-afford-them" type, the type which provides useless employment.

12 Plan to expose the fraud of squandering on current expenses the money obtained by so-called "social security" taxes on workers. Let us not get the idea that we are establishing security when we have nothing but government IOUs as an insurance fund. These IOUs are worthless except as we are taxed a second time to raise money to pay ourselves off.

13 Plan how to put every local resource, human and physical, to its greatest productive usefulness. This embraces a multitude of tasks in industrial and marketing research.

14 Plan to attract to and support in public office men who have an understanding of the broad benefits of free competitive enterprise, who know the conditions under which it will thrive and who can be depended on for a sincere pursuit of their elected purposes—men who care more for adherence to good principles than they care for election to office.

15 Plan how we can best arrange for the freest flow of goods and services between nations without expensive international gifts and subsidies, gifts and subsidies disguised as exchange stabilization.

16 Plan a broad public understanding of the fact that international morality and economic integrity are fundamental to any advancement in world trade or in world peace, and that it matters little how we try to organize the postwar world if these virtues are absent.

17 Plan a revision of our government so that it will assume the role of referee; that it will keep the enterprise arena ordered for fair play; that it will suppress violence and fraud; that it will enforce contracts; that it will look to the public interest as distinguished from that of pressure groups; that it will not concern itself with which ones of its citizens win in the competitive race; that it will not enter the competitive race itself, the government being the citizens' servant; and that it will confine itself to those activities for the success of which an element of compulsion is necessary and which are therefore unsuited to private endeavor.

Steel Mill Sectionalizes Drive

Large single speed a-c motors and gears give way to sectionalized drive with pulpit control in new California high-speed continuous rod mill. 1,000 kw. ignitron rectifier supplies auxiliary d-c power

G. L. Beaver

Industrial Division, Pacific District,
General Electric Co.
San Francisco

STEEL rod at the rate of 48 m.p.h., is now being produced under full-time operation of the Columbia Steel Co.'s new continuous rod, sectional drive, mill at the Pittsburg (Calif.) Works. Completion of this plant marks another step in the $700,000,000 war expansion program of the United States Steel Corp. This mill, which furnishes rods to Columbia's adjacent wire mill, is the most modern continuous type plant in the United States built for three-strand rolling, and adds materially to finished steel facilities in the Pacific Coast area.

At this speed of 48 m.p.h, size No. 5 rod nearly a mile long, produced from one 600-lb. billet, is delivered to reels in about a minute from the time the billet leaves the suspended-arch type furnace. These 600-lb. billets, 30 ft. long, are fed one by one into a 33 x 50-ft. furnace having an hourly heating capacity of 50 tons of billets, thus insuring a steady flow. All steel heating operations are automatically controlled from the fuel mixture ratios to the temperature of the heated billet.

The mill, as shown in the layout of Fig. 1, has twenty-one stands, divided into nine roughing stands, six intermediate roughers and six finishing stands. One of the accompanying photographs shows the nine roughing stands with their large water-cooled bearings. Three strands of steel can be handled simultaneously throughout the mill. An interesting operating feature is the fact that steel from one billet is being rolled in all of the 21 stands at the same time. When the leading end of the rod being rolled emerges from the last stand, approximately two-thirds of the original billet still remains in the furnace, and has not yet entered the first stand.

Individual Mill Stand Drives

From an electrical standpoint the mill presents many new and interesting features. Single-speed, large-capacity, a-c motors operating through a system of line shafts and gearing found in older types of rod mills, have given way, in marked contrast, to sectionalized drive with adjustable speed d-c motors. Nine such motors, A to H inclusive, and J, are used for driving the mill stands.

Dividing the mill into a number of units, each with its individual d-c motor drive, made possible quick and easy changes in speed relationship between the various stands, thus permitting a greater variety of products and easier operation of the mill. The wide range of rolling schedules made possible by this flexibility in control is one of the chief advantages of the sectionalized type of drive.

Provision is made to feed the rod automatically into each successive stand and into the reels, thus entirely eliminating manual manipulation of the hot materials. Shown in one of the accompanying photographs is a view of the intermediate section of the mill in which the repeaters between stands 12 and 13 and 13 and 14 are clearly shown. Following stand No. 14, the mill is arranged so that the output of this stand may be sent either directly to the pouring reels when reeling the heavier rod products, or to stands 15 to 20, inclusive, for further reductions and ultimate delivery to the laying reels when rolling the rods of smaller diameter.

After leaving the final finishing stand, the rod passes through water-cooled connecting pipes to the reels. From the reels, the bundles of finished rods are switched onto an apron conveyor and headed toward the loading platform. At the end of this conveyor, the bundles are transferred automatically to a hook-carrier conveyor, designed to cool the rods before handling.

Rod bundles are removed from the hook conveyor by manually operated air hoists and placed on stands. Groups of coiled rods are then picked up from the stands by tractors and loaded on specially constructed flatcars for transfer to the wire mill.

The rod mill is a complete unit separate from the rest of the rolling mills and is served by its own auxiliary equipment. The roll shop for shaping and renewing the rolls is entirely modern in every respect.

A quick roll change feature of the rod mill is the conventional type of wobblers with the innovation of built-in universal drives on the coupling boxes and spindles, which minimizes loss of time for roll changes, and provides smooth, vibrationless running of the mill.

The mill rolls are carried by fabric and ball thrust bearings adapted to the requirements of the job according to the most recent experience in rolling mill equipment. Rod ordinarily turned out in the mill is No. 4½ gage, but

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Here on the West Coast new wartime industries and war-inspired expansion of existing industrial plants running into the hundreds of millions of dollars has taken place. However, few realize that herein lies a mighty Western Industrial Empire in the making—unfolding with accelerated progress—developments that otherwise would have taken years—perhaps decades.

Take this new modern rolling mill of Columbia Steel—witness the same company's new $150,000,000 steel mill in Utah—look at Kaiser's new steel rolling mill in southern California, representing an investment of $100,000,000 when fully completed. These mean that Steel is preparing for Western markets that surely will develop.

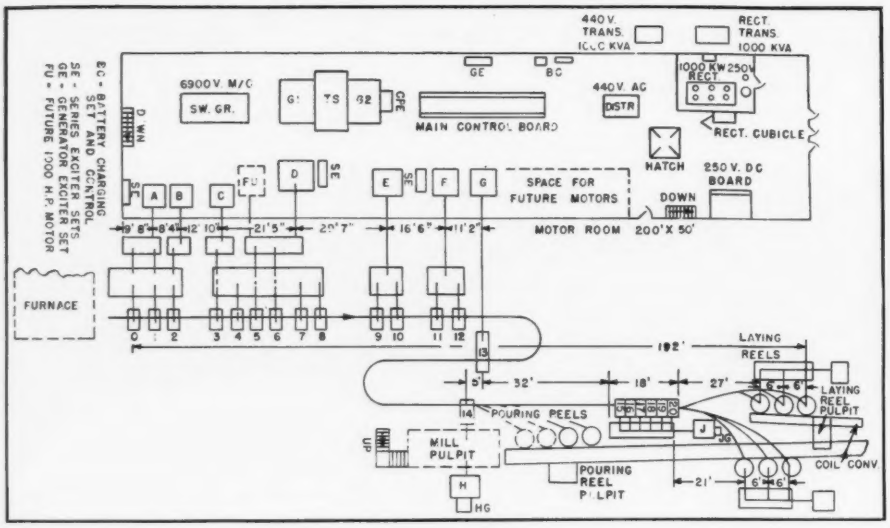
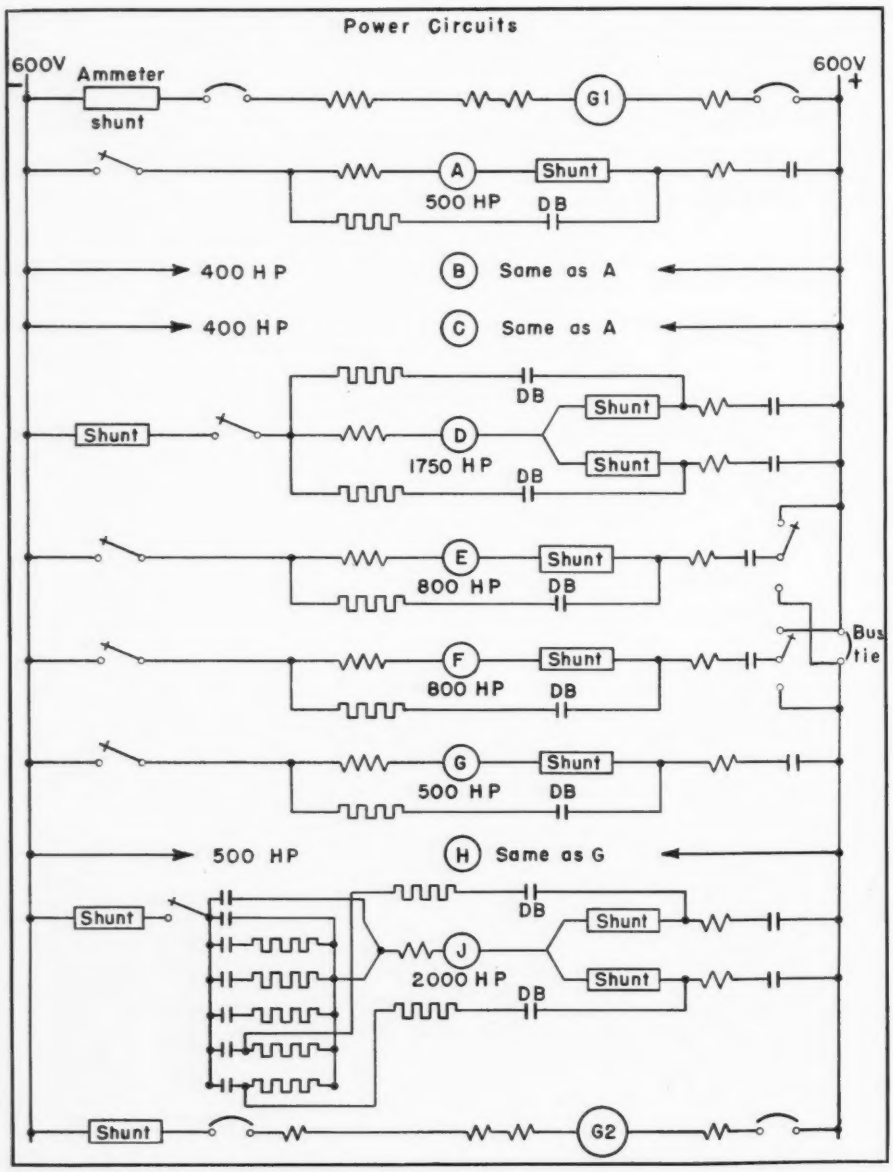


Fig. 1: Electrical and mechanical layout of Columbia's Pittsburg, Calif., rod mill

No. 5 gage up to and including 1-in. coiled rods, also may be produced.

Electric Equipment

Electric equipment for this mill was supplied by the General Electric Co. A complete tabulation of the main drive 600-volt motors, which are of the adjustable-speed mill type, is given in the table on page 46.



Seven of the nine main drive motors are housed in a separate motor room, which is air conditioned to remove the heat of the motors and to protect them from dust and other abrasives in the air. A water re-circulating system is provided, made up of a settling tank, a clari-floculator tank, a cooling tower, and suitable pressure pumps for returning the water to the mill, so that only make-up water is required.

The mill motors are operated from two 2,500-kw., 600/450-volt generators, one of which normally supplies power for the first four motors and the other, normally, for the last three motors. Provision is made for supplying motors E and F, either one or the other, or both, from either generator. These generators, together with a 150-kw., 250-volt exciter, are driven by a 7,200-hp., 0.8 power factor, 514-rpm., 6,600-volt, three-phase, 60-cycle synchronous motor, forming a four-unit motor-generator set. The 150-kw., 250-volt exciter supplies excitation for the main roll motors and for general control purposes as well.

All of the motors have separately excited main fields and separate auxiliary windings on the main field poles. In order to obviate as much as possible variation in speed of the rolls, the auxiliary fields are energized from series-compound exciters, designed to maintain a speed regulation of not more than 1½% variation from full load to friction load.

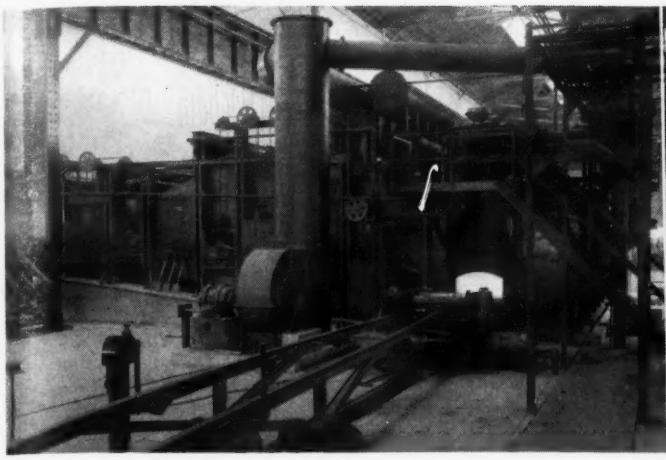
The motors as well as the generators are designed for continuous operation as open machines at rated loads with a temperature rise of the windings not exceeding 40°C. They will also carry momentary loads of 200% at any speed up to 200% of base speed and 175% load momentarily from 200 to 300% base speed.

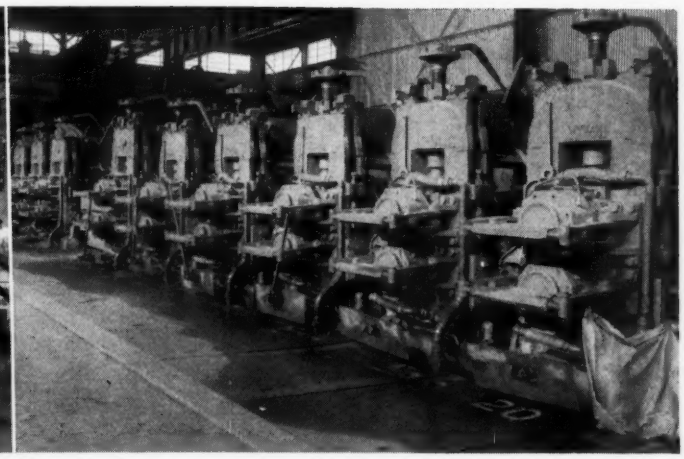
For furnishing 250-volt, d-c power for cranes and mill auxiliaries, a 1,000-kw., 250-volt ignitron, single-anode, multiple-tank, mercury-arc rectifier is used. For supplying 440-volt, three-phase, 60-cycle a-c for miscellaneous small constant-speed drives, a 1,000-kva., 6,600/480-volt, three-phase, oil-cooled transformer is installed. This, as well as the rectifier transformer, is installed just outside the wall of the motor room adjacent to the 440-volt distribution switchgear and rectifier.

Motor Room

In the motor room, which is 200 ft. long by 50 ft. wide, are placed mill

Fig. 2: Electrical equipment arrangement of the mill schematically shown





Left: Temperature and fuel mixture ratios are automatically controlled in the 50-ton billet heating furnace. Right: Unit roughing stand drive with adjustable speed d-c motors permits ease of control and greater variety of products. Built-in universal drives on coupling boxes and spindles minimizes time required for the roll changes

motors A to G, inclusive, for stands 0 to 13, inclusive, the main motor-generator set, the 6,600-volt, metal-clad a-c switchgear, the main control board, and switchgear for the 440-volt a-c and 250-volt d-c feeder circuits. A general view of this room is shown in one of the accompanying photographs. The main control board provides control facilities for the 600-volt, d-c generators and motors and their related exciters, as well as for the control of the 440-volt a-c motors. Also installed in the motor room are various smaller motor-generator sets, such as the three series exciter sets, the generator field exciter set, and a small battery-charging set.

In the basement of the motor room are placed generator and motor field rheostats, the starting reactor for the 7,200-hp. synchronous motor, the mill stand motor dynamic-breaking resistors, the battery and the ventilating equipment.

Ventilation

Air from the motor room is taken into the main generators at the commutator end, discharged through covers at the rear end, whence it is drawn through surface air coolers by means of two 29,000-cfm. motor-driven blowers and discharged into the basement. It is then sent back to the motor room through air ducts. Similar facilities are provided for the mill stand motors. Capacities of the various fans and surface air coolers are varied to suit the capacities of the related motors and generators. This arrangement follows the conventional down-draft system of ventilation.

The motor room as well as the basement is constructed to prevent excessive leakage, so that a minimum of make-up air is needed. With the entrance cooling water 80°F., the air is discharged from the coolers at a temperature not exceeding 90°F. The synchronous motor driving the generators is provided with enclosing covers and corresponding appropriate facilities for obtaining forced ventilation.

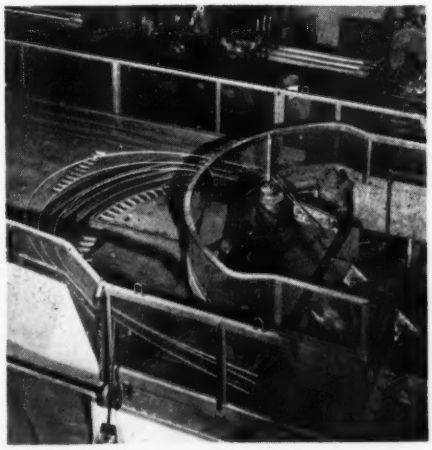
Motors H and J driving stand No. 14 and the finishing train are located in the mill proper. They were provided with enclosing covers and each is supplied with cool air by means of a motor-driven fan in a closed, self-contained, re-circulating system with surface air coolers.

Reel Drives

Connected to the armature shafts of motors H and J are d-c generators for supplying power to motors driving the reels. Generator HG on motor H is rated 18.8/52-kw. and operates the two adjustable-speed pouring-reel motors, each of which is rated 25 hp.

Motor J drives a 32.6/50-kw. generator JG which supplies power to two 20-hp., adjustable-speed motors driving the six laying reels. In this manner the reels automatically follow any speed variations of the drivers H and J.

Three strands of rods being looped through the repeater (foreground) from continuous roughing stands into semi-continuous intermediate stands



Power Supply

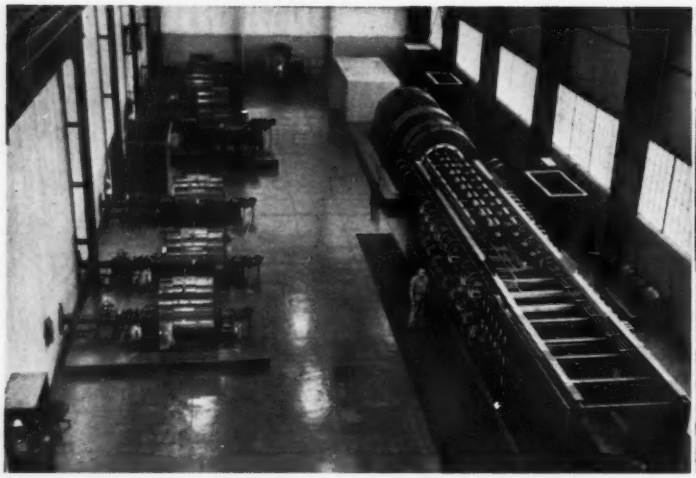
Power supply for the rod mill is brought to the motor room underground over a 6,600-volt feeder from the main substation at the Pittsburg Works. Control is through metal-clad switchgear and oil circuit breakers having an interrupting capacity of 500,000 kva.

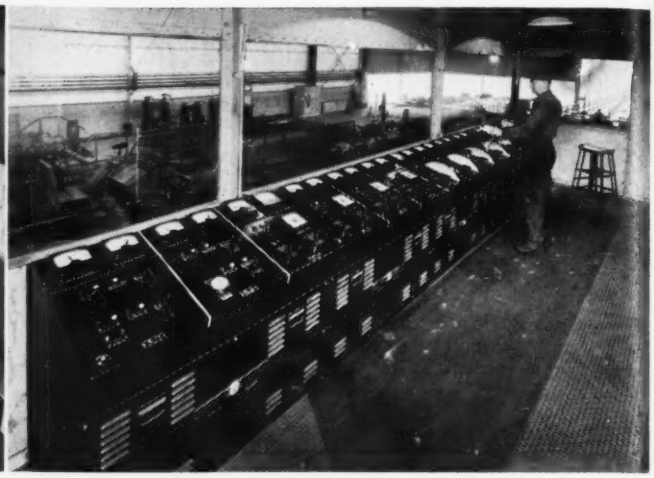
Choice of 6,600 volts as the main power supply voltage was influenced by the fact that for years this has been standard with the steel industry in the East. Any deviation from this standard in future plants would be in the direction of 13,800 volts, and even multiples of 6,600 volts.

The main metal-clad switchgear is shown in the background of the photograph of the motor room. All instruments, relays, and control switches are mounted on hinged front doors, thus minimizing the conduit, wiring and installation costs. The 7,200-hp. synchronous motor of the main m-g set is started at reduced voltage by means of a conventional starting reactor. Switchgear equipment for control and distribution of the 250-volt d-c, and the 440-volt a-c auxiliary power supply also is located in the motor room.

Motor and Generator Control

Principal circuits of the main motors and the 600-volt generators are shown in the accompanying electrical diagram. The roughing mill motors A, B, C, and D are connected to generator G-1. Ward-Leonard control is used for starting these four motors and for adjusting their speed as a group. Each machine is connected to the bus through one or two electrically operated circuit breakers or contactors. Each motor can be quickly stopped by tripping its circuit breaker or contactor and applying dynamic braking. Each mill stand motor is provided with





Left: Air conditioned motor room houses mill drive motors, 5,000-kw. m-g set and main switchboard. Right: Pulpit operator controls speed; synchronizes mill by master control board

its field rheostats for coarse and fine adjustment of speed.

The motors G, H, and J are similarly connected to generator G-2 which normally also supplies motors E and F. However, as previously stated, provision is made for supplying motors E and F, one or the other, or both, from either generator G-1 or G-2. Control of these motors is identical with that of the motors A, B, C, and D. Motor J is also equipped with complete magnetic starting and dynamic braking control. Thus it will be possible to stop and restart motor J without affecting the motors driving the intermediate stands.

The voltages of generators G-1 and G-2 are controlled by a common potentiometer type field rheostat operating in conjunction with generator voltage regulators, one for each generator and its related 600-volt bus section. The arrangement of connections is such that the voltage of each generator is independently regulated and controlled, even though a common potentiometer rheostat is used for simultaneously raising and lowering the voltages.

Centralized Control

The control of all mill drives is centralized in a desk located in the operator's pulpit overlooking the mill. Generator voltage, motor speed, closing, and tripping of machine breakers and contactors is controlled from this desk. Necessary safety interlocking is included with the control, greatly simplifying the task of the pulpit operator. The desk is equipped with an ammeter and speed indicator for each mill stand motor.

The vernier, or fine adjustment, rheostats for motors, A, B, C, and D, are motor operated, as it was considered advisable to have the speed of these four motors adjustable not only from the pulpit but also from the mill floor. A control cabinet located at stand No. 1 is provided for this purpose. The vernier rheostats for drives E, F, G, H, and J, however, are lever operated.

The contemplated generator voltage range used for speed adjustment of the mill drives is 450 to 600 volts. This voltage may be held, of course, at different values at the two bus sections. Once adjusted, these voltages are held constant by means of two voltage regulators acting on the generator fields through suitable generator field exciters. This close voltage regulation assists materially in maintaining constant pre-set speeds of the mill drives.

In an emergency, a tie can be closed between the two 600-volt bus sections by means of circuit breakers, thus enabling generator G-1 to be controlled with generator G-2. When the bus sections are tied together, only one voltage regulator is in service.

An instrument panel is provided as a part of the main control board located in the motor room. This panel provides a recording ammeter for each 600-volt generator and mill stand motor. All of these recording instruments are mounted in a central location and means are provided for simultaneously increasing the chart speeds of all the recording instruments from 3 in. per hour to 3 in. per minute for making simultaneous load tests. A test pen is also provided on each instrument for marking the chart. An unusual feature is that marks can be made simultaneously on all charts, and the speeds of all charts simultaneously increased, through the manipulation of master switches.

Stand	Motor	Hp.	Rpm.
0–1	A	500	250/750
2	B	400	250/750
3	C	400	250/750
4–8 Incl.	D	1750	150/450
9–10	E	800	300/900
11–12	F	800	300/900
13	G	500	225/625
14	H	500	225/625
15–20	J	200	450/690

Auxiliary Drives

In addition to the main drive equipment and exclusive of the small a-c motors required for driving ventilating fans and other miscellaneous purposes, a total of twenty-three d-c motors ranging in capacity up to 40 hp. is used to drive the various auxiliary apparatus. Auxiliary power drives consist of the various conveyors, feed reels, pushers, coil conveyor, etc., mechanisms for mill traverse adjustment, and those used in connection with handling the reels at the pouring and laying reel locations.

Most of these motors are of the totally enclosed, heavy-duty, d-c mill type with magnetic control located at two points. Control facilities for the auxiliaries in the vicinity of the furnace are housed in a small separate room, while the control panels required for the other auxiliaries are housed in a larger control room located on the mezzanine floor above the mill and opposite the motor room.

Two secondary control desks are used for the control of the auxiliaries required for handling the reels. One desk, designated "pouring-reel pulpit," is located near the pouring-reel. The other, designated "laying-reel pulpit," is located near the laying-reels. These desks mount the manually operated facilities and indicating instruments for the control and speed adjustment of the auxiliaries in the two locations. The coil conveyor motor is controllable from either the pouring-reel or the laying-reel pulpit.

Thus, in this modern steel mill the electrical engineer has again lent his hand to high-speed, low-cost, coordinated production by his contribution of perfectly controlled, synchronized, sectional drive.

Switch and Fuses Replace Circuit Breaker on 60-Kv. Subs

C. E. Baugh
Pacific Gas and Electric Co., San Francisco

THERE are numerous nominal 60-kv. transmission lines in the country, particularly west of the Mississippi River, which have dual functions. Many of the lines of these systems were built originally as transmission lines from hydro generating stations to remote load centers. With the use of much higher transmission voltages and the growth of load in rural areas through which these 60-kv. lines pass, it is now common practice to tap them at many intermediate points to serve relatively small loads ranging from 1,500 to 5,000 kva. To this extent they serve as high-voltage feeders rather than as transmission lines.

Protective Equipment Necessary

Automatic circuit opening equipment is installed on the source side of substation transformers supplied from such high-voltage transmission — distribution systems for two reasons. First and most important is to provide protection to the remainder of the system from the effects of transformer failures and short circuits on low-voltage station buses and other wiring on the source side of the low-voltage breakers. The second reason, of somewhat less importance as far as utility companies are concerned, is to reduce the amount of damage done to the transformers themselves in the event of a winding failure or a primary bushing flashover, or in the event of a secondary short circuit which might not be cleared by breakers at remote points on the transmission system in time to avoid damage to the transformers.

Circuit Breaker Too Costly

With transformer capacity at any one location limited to 5,000 kva. or less, by the economic problems involved in the distribution of energy in rural areas, the cost of an oil circuit breaker (available under present NEMA rules with a minimum interrupting rating of 500,000 kva. in the 69-kv. class) is entirely disproportionate to the cost of the remainder of the substation equipment. The function of automatic circuit opening devices outlined above can be fulfilled by adequate fuses in combination with air break disconnecting switches as suitably as they can be with oil circuit breakers, with very minor exceptions. Installed costs for high-voltage switchgear and transformers are indicated in the accompanying table. They do not include the cost of low-voltage switchgear but do include the cost of high-voltage switchgear and transformers. They point to the fact that the cost of high-voltage oil circuit breakers exceeds the cost of transformers in the smaller stations.

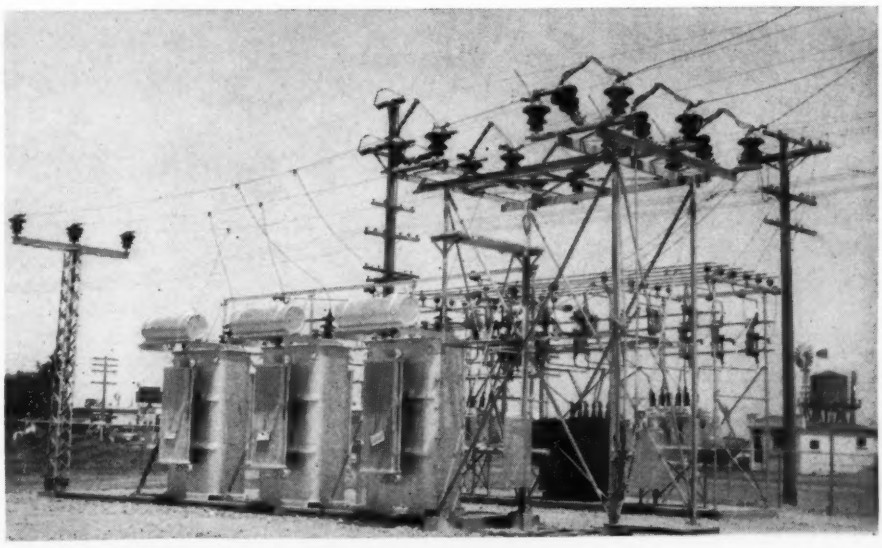
Fuses, Breakers Compared

The principal disadvantages of fuses in comparison with oil circuit breakers are (1) possibility of single phasing damaging consumers' equipment, (2) added maintenance costs of fuse replacements, (3) additional time required to restore service after a fuse has blown. These disadvantages are not serious and can be overcome to a great extent. Single phasing will cause a partial or total interruption of service, depending on transformer connections, but damage to consumers' equipment can be prevented by the proper application of common protective devices at the substation or in connection with three-phase utilization equipment. The possibility of such damage frequently exists due to the normal use of fuses on the primary side of distribution transformers and is increased to a minor extent by the use of fuses on the high-voltage side of the substation transformers. The added maintenance cost for replacing fuses is more than offset by the maintenance cost chargeable to oil circuit breakers for filtering oil, routine inspection of breakers, and inspecting, testing and maintenance of relays, battery and control circuits. The additional time required to restore service after a fuse has blown is considerable in itself, but the type of stations under discussion generally are located in outlying districts with no operators in attendance, and the overall length of an interruption is governed largely by the time required for a maintenance man to get to the station in trouble.

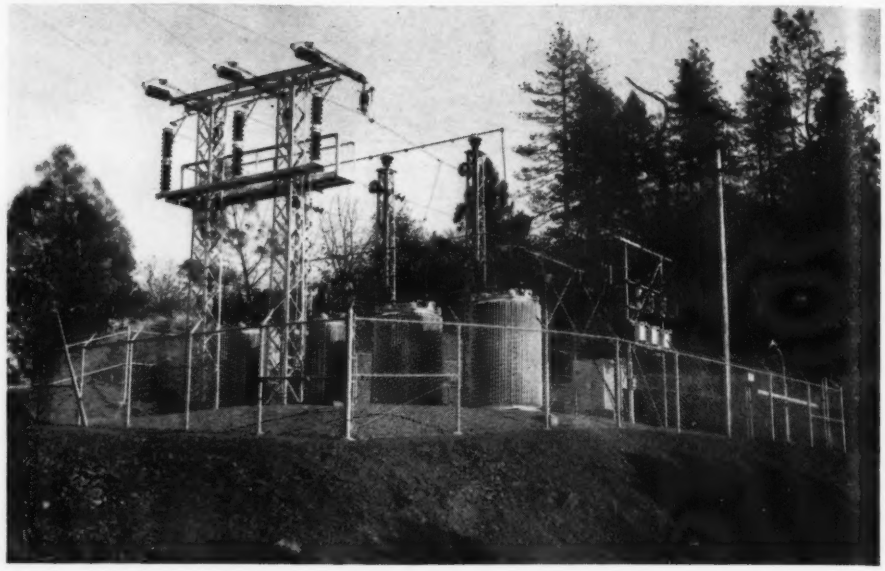
Cost of oil circuit breaker exceeds cost of transformer in 60-kv. substations of 3,000-kva. capacity and less

Fuses Prove Safe, Reliable

Pacific Gas and Electric Co. has about 175 substation transformer banks connected to its 60-kv. system which are protected on the high-voltage side with combined disconnecting switches and fuses. Installations made in the past 20 or 25 years have been



About 175 of these substation transformer banks protected by combined disconnecting switches and fuses are connected to PG and E's 60-kv. system



designed with the idea in mind of making the procedure of re-fusing as safe and as expeditious as possible. Disconnecting switches are gang-operated and a gang-operated grounding device which grounds both sides of each fuse is provided. This grounding device is mechanically interlocked with the disconnecting switch so that the grounding switch cannot be closed unless the disconnecting switch is open. A fusing platform from which an operator can reach the fuse holders to replace fuses by hand is provided. Each station is equipped with a complement of spare fuse holders and spare fuse cartridges of the proper ampere capacity. In addition, a set of 10-amp. cartridges to be used as test fuses is furnished. These 10-amp. fuses will not blow on exciting current inrush but will function almost instantaneously if a fault exists. Fuses are now available in several makes of adequate interrupting capacity for any fault which might occur in the average 60-kv. system, which can be refilled on the job. Trouble due to damage caused by single phasing has been negligible over the entire period of use of high-voltage fuses. Air break disconnecting switches have proved to be entirely adequate to interrupt transformer exciting currents in the range of sizes noted.

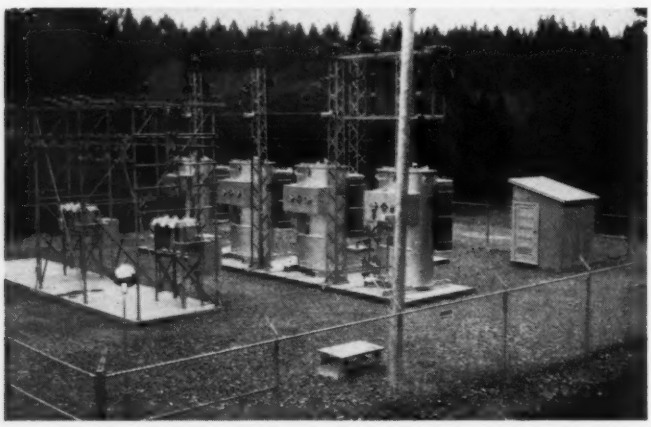
Comparative Costs of High Voltage Switchgear and Transformers

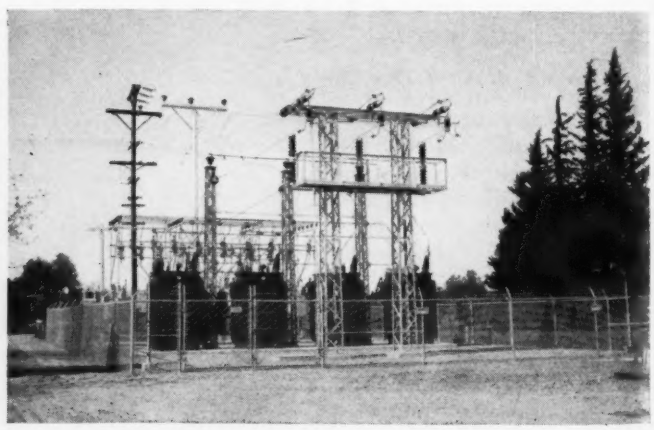
	Kva. Capacity of Station			
	1,500	2,000	3,000	5,000
Cost of 3-phase transformer, installed.	$ 8,300.00	$ 9,500.00	$11,300.00	$14,900.00
Cost of 500,000-kva. oil circuit breaker with bypass and disconnecting switches, supporting structure, 24-volt control battery, wiring, etc., installed	11,500.00	11,500.00	11,500.00	11,500.00
Cost of combined switch and fuse and supporting structure, installed....	2,200.00	2,200.00	2,200.00	2,200.00
Total cost, transformer and breaker...	19,800.00	21,000.00	22,800.00	26,400.00
Cost per kva., transformer and breaker	13.20	10.50	7.60	5.28
Total cost, transformer and fuse.....	10,500.00	11,700.00	13,500.00	17,100.00
Cost per kva, transformer and fuse....	7.00	5.85	4.50	3.42

On a 5,000 kva., 60-kv., distribution substation, cost per kva. for transformer and circuit breaker is reduced from $5.28 per kva., to $3.42 per kva., by using air-break switch and fuses in place of an oil circuit breaker

The coordination of high-voltage fuses with low-voltage feeder breakers and with oil circuit breakers at sectionalizing points in the high-voltage system is relatively simple, particularly if advantage is taken of the range in time-current characteristics available in modern fuses. A minor precaution that must be observed is to leave the neutral of star-delta banks ungrounded to avoid the blowing of fuses on transmission line faults.

The economy achieved by the use of fuses in place of oil circuit breakers is evident. The point is often made that an obsolete type of oil circuit breaker, no longer useful as a line breaker, can be used as a transformer breaker because transformer faults are not liable to impose as high a duty as do line faults. This premise is correct, but if protection to the remainder of the high-voltage system is of real importance, a fuse of adequate interrupting capacity is a better protective device than an oil circuit breaker of questionable interrupting capacity.





Condenser Fields Re-insulated in Utility's Own Shops

Special tools and technique developed by Edison Co. turn out as good as new job

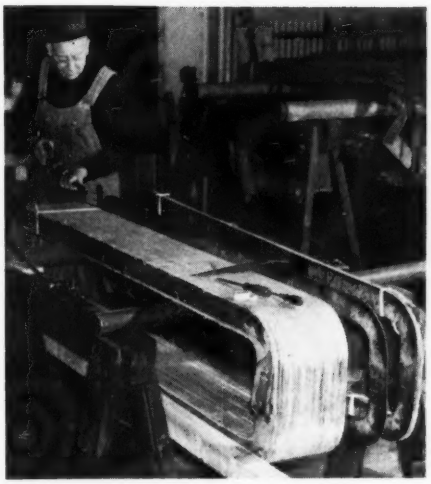
SEVERAL jobs of re-insulating the field windings of large synchronous condensers have been completed by Southern California Edison Co., at its shop and test division at Alhambra. The re-insulated field windings give as good service as new windings, it is reported.

The first operation is to clean up the copper. Special tools were made for the air hammers used in splitting the turns apart. After the turns of the coil are separated, the coil is immersed in a caustic solution and boiled for several hours. This loosens the insulation so that it can be washed off with a stream of water. The coil is then suspended on a pipe rack and smoothed up by sanding, partly by hand and partly by motor-driven portable disc sanders.

The coil is now ready for the application of the new turn insulation which consists of one sheet of mica between two sheets of asbestos paper. An older method of applying the sheets of insulation using shellac and clothespins has been displaced by a new process developed that is less tiring for the workers, more economical in labor and at the same time saves shellac, now a critical material.

Baking, Sizing and Testing

The coil is next placed in a steel press where, by clamping, it is brought down to exact size during the baking process. The baking process is carried out by passing direct current through the winding. A final temperature of 165° C. is sufficient to polymerize the shellac and the coil comes from the press stuck together in a solid mass. Any excess of hardened shellac and the protruding edges of the turn insulation are cleaned off and the coil is then tested to make sure that no turns are shorted.



Splitting open turns of field coil prior to cooking in caustic tank. Air hammer tool made especially for this work

Coil Boxing

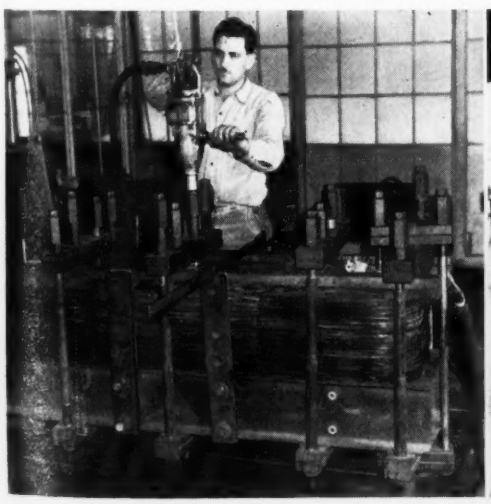
The boxing, which is the insulating pad between the pole piece and coil, consists of mica, paper, asbestos cloth, muslin, shellac and bakelite varnish. It is built up inside the coil and held in place by wood forms. Further baking sets the boxing in place in a solid mass. After removing the wood forms the boxing is trimmed and varnished. The coil is then placed on the pole piece ready for a high-voltage test to ground.

Final Test

A final test for shorted turns is made with the pole piece in place. The completed unit is now ready for crating for shipment. If coils are not to be shipped with pole piece in place, a different type of crating is used.

In re-insulating the coils, mica has been added between turns. This is now standard practice with manufacturers, which was not the case, however, when the machines were built.

Re-insulation of one of the 30,000 kva., synchronous condensers at the Edison company's Laguna Bell substation is shown in the accompanying photographs.



Left: Baking is done by direct current, while air impact wrench is used to run down nuts for clamping coil to size; Center: Pole pieces lowered in place before making ground test. Right: Complete coil assemblies are clamped ready for shipment back to substation

British Shockproof Substation Design

Plan involving mounting substation equipment on solid center walls and floating floors has come out of bombing of England

OUT of the bombing of England has come a new shock resistant substation design described in the Feb. 19, 1943 issue of *Electrical Review*, London, embodying the idea of mounting equipment on a solid center wall and floating the floors. Features of the design, shown in the accompanying drawing, conform to recommendations of the Electricity Commissioners, and confirm the contention that sectionalizing and dispersal arrangements add materially to reliability and continuity of supply.

A major segregation is provided by housing a section of the switchgear in each of a number of widely dispersed switch houses, all controlled from a common control house. The essential structural feature of each switch house is that the building proper is built around the switchgear.

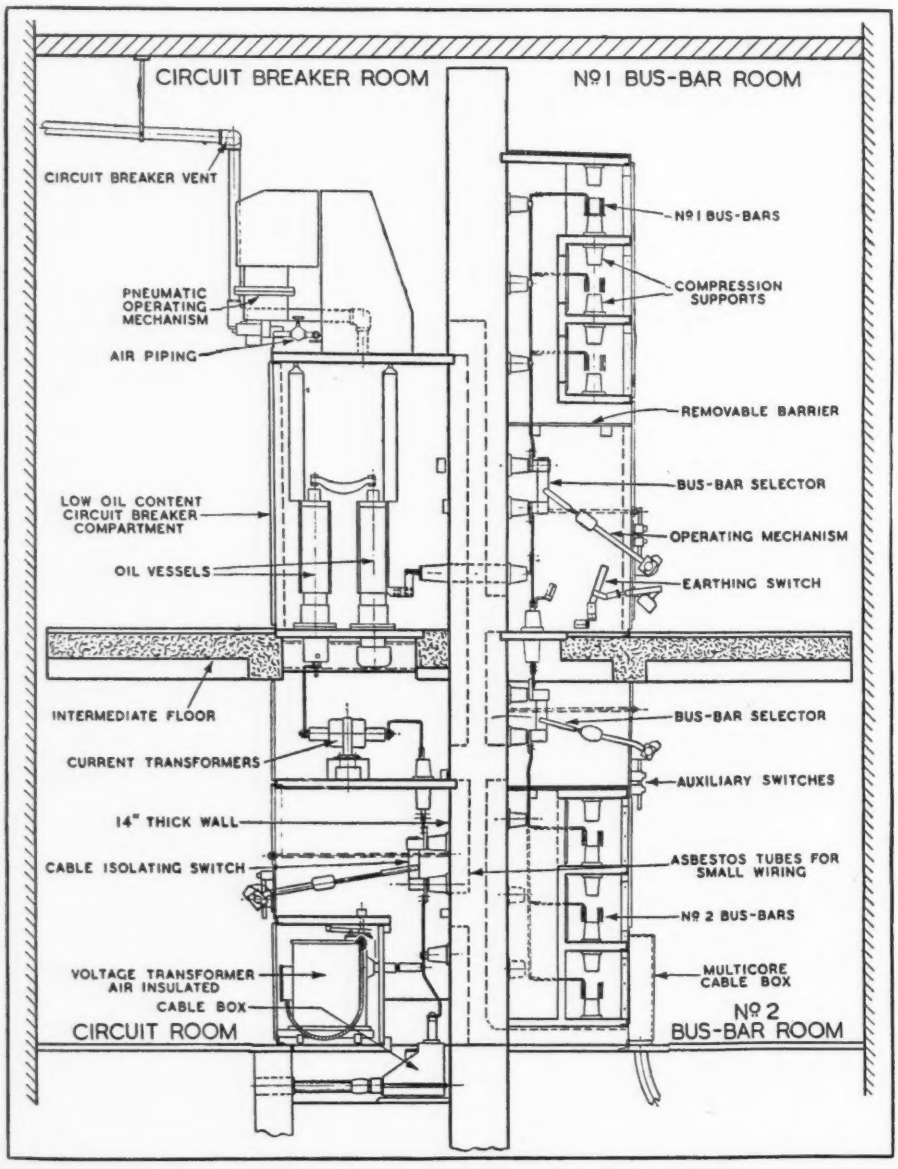
A 14-in. center wall running longitudinally divides the building into two parts horizontally. The whole of the distribution equipment is built on this center wall, on either side. There is a substantial concrete raft into which the building steelwork is tied, and on this stand the 14-in. windowless outer brick walls which are supported by a 6-in. reinforced concrete roof. The center wall is not tied to the roof, nor is the intermediate floor tied to the outer walls. In fact, a space is left between wall and roof and floor and walls. Girder brackets, fitted with rollers built into the outer walls, support the floating floor.

Movement of the outer walls and the roof due to shock are thus not transmitted to the central structure carrying the main equipment.

Also, the horizontal wall and the intermediate floor form effective blast partitions. At each end of each room there is a blow-out blast door panelled with waterproof fabric. All four doors at either end of the building open out into an access chamber in which are staircase and landing serving the upper story. The outer walls of the access chambers serve as blast protection walls for the entrances.

With these segregation measures in respect to the building it is logical to find a layout of switchgear in which the maximum dispersal of components is obtained. This has been accomplished by a novel and interesting scheme employing stone cubicle switchgear. An essential feature of this design is the use of minimum oil circuit breakers. The cells are constructed of 2-in. and 3-in. pre-cast concrete slabs fitted into a skeleton steel framework. The whole is built into and forms part of the central structure of the switchgear building. Thus, a particularly rigid and substantial construction is obtained, offering maximum resistance to blast conditions.

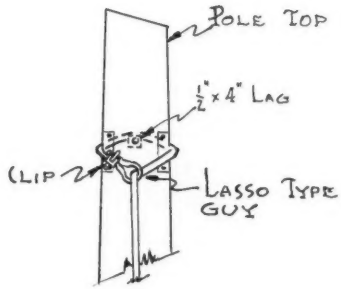
An outstanding feature of the design as a whole is the use of low-oil-content type circuit breakers. Aside from the small quantity of oil in the circuit breakers, no other insulating oil is used, the potential transformers being of the air insulated type and the current transformers of the single-turn bar type. Each phase has a double break, thus making six vessels or pots for a complete switch. A total of only about 5 gal. of oil is required for all.

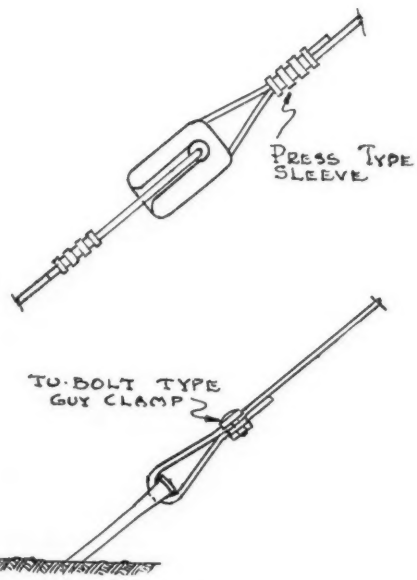


Rigid center wall and floating floors in British substation design suggests possibilities for earthquake construction. Housing switchgear in a number of widely separated units adds materially to reliability and continuity of supply. Switch house building proper has been built around the switchgear

Distribution Fundamentals

"A Real Guy"





"Sketches of Another Guy"

Dear George:

WHAT'S in a name? Bill means what you get the first of the month; Jimmy means a short crowbar; Frank means 20c in French money—but a GUY by any other name has to support a pole line, and when you have to support anything, it takes Jack. Now, anytime you hit the company's treasury for a dollar, you really sign an I.O.U. for 106 cents, so economy should be the watchword. Someone has said that economy is spending money without having any fun doing it, and he sure knew his mathematics. Most companies still have a lot of fun making up their distribution guys.

Tell a woman that a steel wire guys a pole, and she'll ask, "What about?" And this isn't such a dumb question when you look around, and see about half the distribution guys swaying in the wind. Maybe cars hit some of them; maybe some of the rods pulled loose; maybe some of the angles were so small the pole didn't need any help. Whatever the reason, these guys would look more spic if they had less span.

For overhead distribution, on the average there's a guy for every fifth or sixth pole, so it's easy to see why guy design should get more attention. Most linemen are as fussy about making up a guy as a woman is about not getting her hat on straight, and they take as much time in the process. Seems like there are 10,000 rules for getting into trouble, but very few good ones for staying in the clear. Wasting time on guy make up is just another way of pulling the boss's leg without laying hands on him.

There is no question about careful consideration and installation of guys where real strains are involved. But on the lighter strains, small angles and many secondary dead-ends, costs can be cut in half. In the first place, labor costs can be lowered and in the second place materials costs can be brought down. It's the old story—one if by land, and two if by sea—but it's cheaper to walk.

Let's consider materials first. Any type of guy fitting, clamp, or anchor that brings the over-all cost down and renders the desired service, pays. Wire rope clamps are used extensively in guy work, but the lay in the saddle of these clamps is opposite to the lay of a guy strand, so the tu-bolt type guy clamp might be better. Angle guy fittings, thimble eye bolts, and eye nuts are definitely in the picture. Press type sleeves are used for splicing wires, so they should have a place in guy work. In fact, they seem to have the brightest future, once the right sleeves and installation tools are developed. No need for several clamps, either, where one will suffice. The lasso type guy has been tried with good economies and results. Concrete anchors, old engine flywheels, locally cast iron cones, and even the old treated wood slug are all in the picture. Higher strength guy wire such as utilities grade offers economies. Elimination of guy guards is a step in the right direction in those places where traffic can't possibly get near the guy anyway. Maybe guys can be packaged in the shop. Thus the elimination of serving a guy, the use of lighter guys, the application of simple clamps or sleeves, and being able to make a guy up in the shop or on the ground will lower labor costs.

Yours,

THE OLD SOUP.

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Put Small Business Into War Production

LARGE war industries are spectacular. They employ many people and absorb large orders of electrical equipment. They consume great quantities of power. But it is the numerous small industries which have served and will serve in the future the ordinary civilian economy. Concentration for war production in huge factories has drawn not only personnel and materials for civilian wares and services away from these small local plants and shops, it has almost killed them off economically.

Yet it is desirable and critically important that as many of these small business be kept alive as possible. To the war effort it is important to prevent crowding and concentration into a few centers. The more dispersed the sources of supply the greater relative security from attack or sabotage. The more people who can work near home at war jobs the less housing and food problems there will be. This is to say nothing of the importance to the basic American economy of numerous and competitive small businesses.

Congressional action has brought into being the Small War Plants Corp. which is assigned the job of helping small plants to share in the major war contracts. Because the basic economy of utility companies is closely interwoven with the life of the small local industries and shops in the territories they serve, it has been natural for them to give their fullest cooperation to any and all measures which would help these industries to survive.

Two companies in the Pacific Northwest have done an exceptionally fine job in this respect. Their methods are reported below. What these accounts from the companies themselves do not say, but what should be said for them, is that the job requires devotion. It is no ordinary sales job. It calls for analysis, imagination, daring, ingenuity, indefatigable footwork, and unwavering optimism in the face of complications, disappointments, setbacks, red tape, delays, scarcities of materials and men. But it will be proved worthwhile if it retains the pattern of small American enterprise for the postwar period, even as it will be valuable in bringing into war productiveness the skills, tools, facilities, know-how and participation of hundreds of small businesses throughout the West.

This is America's strength in depth.

Washington Does

PREFACED by his own comment that the work had sometimes seemed unpromising of results to the management but that the persistence and faith in it of one man, who lived with the job day and night, had finally shown tangible contract results, R. B. McElroy, general sales manager, read the following report in brief prepared by Ladner V. Ross, manager of commercial sales, Washington Water Power Co., to the Northwest Electric Light & Power Assn. Utilization Section meeting.

Reasons for Program

"Most of the company towns outside of Spokane are suffering from outmigration of workers due to the large increase in war industries and military establishments around Spokane and on the coast. As a result, as soon as any concern has to close its doors, the employees move out and we lose not only the revenue from the concern, but also from the homes of employees, and part of the revenue from our customers where this concern and its employees spent their wages. When this occurs several times in the same community we find our all-electric restaurants closing, as well as stores, service stations and other commercial accounts that have suffered from the depleted population.

"On the other hand, when we have been able to get some of our customers in these towns to convert to war production, help them to get suitable contracts and see them get into production, then this outflow of population and revenue slows up, and in some cases, workers have come back home to live. Even in cases where we have not yet been successful in getting a customer going on a contract he has been extremely appreciative of our efforts in his behalf.

Nature of Activities

"Assistance may take the form of obtaining or imparting information relative to current procurements, wartime procedures or priorities; interpreting drawings and specifications; locating materials and prices; helping prepare bids; obtaining financial backing; and similar activities that do not impinge on WPB or SWPC official functions. Perhaps one of the most important of these activities is to try to keep the customer in a hopeful frame of mind so that he won't give up the sponge while waiting for a suitable procurement on which to bid and obtain a war contract.

Results Are Worthwhile

"Actual measurable accomplishments during 1942 were small in comparison to the efforts put forth. Also, customers were skeptical of warnings that regulations and restrictions would force them out of their accustomed businesses.

"However, beginning with the reorganization of the Smaller War Plants at the first of this year, and its subsequent divorce from the War Production Board, results are really piling up. To date this year we have played a significant part in helping our customers to obtain manufacturing contracts for war products totaling well over $1,000,000. These were all small plants having employees ranging from 10 up to a maximum of 60. These contracts include:

"*Wood Products* — Warehouse pallets, crates and boxes, stock bins, ship fenders, sash and doors.

"*Metal Products* — Iron castings, bronze castings, magnesium castings, machining, electronic devices.

"*Textile Products* — Tent flys, tarpaulins, toilet kits, gun covers, ski parkas, Army jackets, mattresses, sleeping bags."

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Such a summary is modest. In fact the entire program is done in such a way as to give assistance but not to attempt to dominate or promote. The greatest care is taken to bring to the principals involved—the government agencies and the small plant managements—only the experience and help of the utility. The government agencies have welcomed this help because at first they were short of staff, had no previous knowledge, in many cases, of

the facilities and abilities of local firms or of their managements and personnel to deliver the type of product needed.

The managements welcomed the help after they realized what it could mean to them because often they lacked understanding of the complicated surveys and forms required, sometimes were engaged in making entirely different products and did not appreciate that they could convert to the one required, were often in need of engineering, financial and procurement help. When this kind of assistance came from the power company commercial and industrial representatives, it filled a need which they felt but had no means of satisfying.

Variety of ways in which this assistance was given is best exemplified by the following actual experiences.

Army and Navy procurement officers were taken to inspect small plants in the area and survey their facilities. Examination and advice was given on new tools. Help was supplied in preparation of plant facilities reports. Follow up was made on bids to the armed services to expedite deliveries and straighten out bottlenecks. Lists of "distressed plants" were obtained for the national register. Assistance was given to try to iron out difficulties in army and navy procedures and to obtain better scheduling of contracts so that employees would not need to be laid off after completion of one contract. Formation of "mother hen" pools aided with a prime contractor furnishing capital and bookkeeping—sometimes a person not in that business at all before—obtaining bidders from other towns and correlation of the facilities of two or three different shops, sometimes in different towns.

A whole day's work often goes into the getting of a customer to bid. Sometimes there is only one drawing available and photostats must be made for several bidders. Estimates on quantities of materials must be made out. Quotations have to be obtained for some items. Sometimes subcontractors to furnish needed fittings or parts have to be found.

Another participation was that in the preliminary research work and then later help in the establishment of a light metal alloy foundry at Washington State College, Pullman, under the supervision of A. A. Kearney, managing engineer, Inland Empire Industrial Research, Inc.

These are some of the ways in which the utility men help. Each case seems to require its own study and its own procedure. But the results to the war effort can be appreciated when letters come from Army officials commending the company for its favorable administrative policy and its intimate acquaintance with the commercial firms in its area and its efforts to help them take on contracts to supply necessary materiel for the Army.

Idaho too

Orland C. Mayer
Idaho Power Co.

IT is difficult to evaluate results from any program aimed to help small industries in their effort to secure war contracts. It is likewise impossible to outline any definite procedure which was followed in securing war contracts. Rather it was a problem of taking conditions as they existed and combining them with the opportunities at the moment to determine if a war contract could be obtained. For this reason the methods used by our company were not uniform. Sufficient to say, the only way we have found to secure war contracts has been by constant effort and by examining every opportunity in hope that some time or other an invitation to bid will coincide with the facilities available.

In order to secure war contracts, it is necessary that the interest, cooperation, and help of four groups be secured and coordinated. They are:

1. The utility company.
2. The government agencies operating in the territory.
3. The large industries.
4. The smaller industries.

It is necessary that the utility be interested in a long-range program. In the carrying out of this program many surveys had to be made. Not only many surveys, but each survey may necessitate from four to six calls on a customer in order to keep up with the additional information desired by procurement offices. This necessarily means that many hours spent are nonproductive, and that many of the surveys made do not produce results. This is discouraging to the customer; and hence it is doubly important that the utility company be sold on the program so as to carry a spirit of confidence that ultimate results will be secured to the customer. Many avenues will have to be investigated. Few contracts, as a rule, are secured.

There are several government agencies vitally interested in helping industries secure war contracts. Some of these agencies were considerably undermanned at first. Aid was given them until such time as their organizations were completed. The Smaller War Plant Corp. recently has been very active in aiding in the securing of contracts.

All distressed firms were listed with the Smaller War Plants Corp. This listing necessitated a survey of facilities, labor supply, past production, conversions which could possibly be made, etc. The SWP then is in a position to help secure contracts for these industries. The corporation also receives notice of critical items needed, and it then becomes a matter of searching the records to determine those which are in a position to make the desired items.

The production division of the War Production Board has been very helpful in aiding industries with their production problems as well as to place them in line for conversion so as to help secure additional contracts.

The priorities division has given aid in securing priorities for such industries with which to complete their contracts on schedule. The completion of contracts on schedule is very vital to the securing of additional business.

Utilities can be of considerable assistance in aiding both the customer and the agency, as well as acting in a liaison capacity between these two groups.

Larger Industries' Interest

Our company has cooperated with the War Production Board in sending bid information to industries which were in a position to make desired items. Larger industries needed help to plan the conversion of their operations so as to produce war materials. Aid was given them in the form of new ideas they might be able to adapt to their operations. Assistance, wherever possible, was given them in solving their production problems.

Perhaps one of the most fertile fields to aid industry was in helping them with their surveys. These surveys are very complicated at times, and have to be remade in order to meet changing conditions. It is not unusual to have to run from three to six surveys on each plant. These aids, while small in nature, helped considerably in securing and maintaining the interest of local industries.

Smaller industries were particularly in need of aid in making surveys. They were supplied with bid information, and suggestions were given them as to how their operations could be changed to make desired items.

In order to aid local industries a number of activities have been particularly helpful. Among these have been the analysis of blueprints and bids. Aid also was given in securing materials, particularly by getting them in touch with the priorities branch of the War Production Board. The securing of additional equipment needed may be classified under two headings —equipment available locally, and

equipment available throughout the country. Locally, a list of idle equipment has been kept current so that such equipment could be referred to industries needing it.

Contracts have been made with national equipment houses and with the War Production Board so as to determine the location of desired equipment. Engineering assistance has been given as to the construction and rearrangement of new plants. This not only refers to building construction, but to wiring, plans, and layout of power equipment.

The formation of pools is a very important step in securing business. These pools, in general, are of two natures:

1. A central nucleus consisting of a large company.
2. Companies of approximately the same size grouping for equipment.

This section of the territory has been very fortunate in having several of its large contractors act as prime contractors to secure war contracts and willing to subcontract them to the smaller members of the pool. This has been accomplished in both the metal working and wood working fields.

The smaller company groupings generally have an active business manager at the head. This manager contacts procurement officers, and financial assistance has been given these men in going to government offices to secure business. Such pools have been very successful in securing war contracts.

As stated previously, it is difficult to say what work has resulted in what business. Undoubtedly, many contracts would have been secured and were secured without a great deal of help from the utility company. Among the items now being made by the industries of southern Idaho are the following: water-tight doors; skylights; hatches, parts of hatches; gun type, van type, and fuel type trailers; landing barges; life rafts; and automatic screw machine parts.

In general, the company lays no claim to being responsible for the securing of this business, but has at all times been ready and available to assist industries with any problems they may have had. It feels, however, that the effort has been worthwhile; and is pleased with the confidence shown by customers in calling for assistance.

The pathways by which war contracts are secured are truly long and devious, and much credit is due industry for the initiative and perseverance which it has exhibited in order to secure war work. Prior to the war program the maximum size of our machine shops was about forty men. This has been increased to over 250 men. Subcontracting has increased this total to over 400 men. This increase has been the result of the interest and cooperation manifested by the organizations mentioned in the beginning, i.e., the utility, the governmental agencies, the larger industries, and the smaller industries. It is our desire and intention to continue contributing in every way possible so that our local industries may participate more fully in the war effort.

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Human interest is not lacking in these arrangements. Nor is enterprise and inventiveness. In one instance a small lumber company willing and anxious to take on a contract to cut lumber for a large prime contractor in Boise with which to supply some subcontracting planing mills material out of which to make crates or pallets, needed a road built before it could operate. The prime contractor was a construction contractor, and so sent bulldozers and scrapers up to the lumber mills and cut its road for the mill.

Another plant needed heavy chain and a hook to lift equipment. That time it required finding a big firm, instead of a small one, to supply it. One was found that could squeeze this small order in with some of its bigger ones.

New methods are often developed from necessity because traditional ones are unavailable. One company developed a new way to expand metal drums hydraulically for use in making submarine net floats, saving half a dozen steps in the process. The ends, too, were developed by a piston method that was new and ingenious.

Small businesses, too, are capable of contributing new methods, important parts, diversified skills and much resourcefulness to the war. They can often make this contribution without migrating their employees from their homes and towns or adding to the congestions and social problems in crowded war production centers. By so doing they help to maintain the essential American economy of diversified and numerous small businesses and service shops. These pay the taxes and buy the bonds with which to finance a large part of the war. The utilities, as local businesses, are natural partners in this mutual enterprise.

● THIS TOO IS SABOTAGE is a motion picture to combat absenteeism caused by improper nutrition. It is prepared by Westinghouse Electric & Mfg. Co. Visual Education Section and made to loan to war plants, schools, colleges, nutrition meetings, etc. The 25-minute sound motion picture is available both in 16 mm. and 35 mm.

Tells Restaurants

In these upside down days it is the home economists who tell the restaurant chefs how to manage meals instead of famous chefs telling home economics classes how to make fancy dishes. For the economy of war has changed emphasis to getting along with less and who knows better how to teach this than the home economist?

Nancy Finch, Utah Power & Light Co. home economist and chairman of the Salt Lake City nutrition committee, was asked recently to conduct a series of meetings for restaurant owners in Salt Lake and Ogden by James L. Purvis, OPA state food rationing representative. Purvis said that the meetings were in response to pointed queries from restaurant operators as to just how they could get by with their meat allotments. To tell the restaurant and eating houses how to manage with meat extenders, meat alternates and the promotion of less familiar foods, Purvis called upon Miss Finch.

Nancy Finch, now appointed to represent Rocky Mountain utilities assisting the regional nutritionist of the Food Distribution Administration. She recently conducted a series of meetings for owners of restaurants

With a real understanding of feeding problems, Miss Finch told the restaurant men that it was their patriotic duty to stay in business, and to do so they would have to have meatless days and to make use of a number of tricks which good housewives had learned to employ in making use of leftovers, extending meat and devising substitutes. She spoke first of foods and menu planning, watching of returned uneaten food for indication of what to avoid wasting, savings in fruit juices and salad dressings, methods of stretching the meat supply by use of dicing and fillers, alternate protein foods, and especially new to restaurant management was her advice on the balancing of meals by better planning and preparation. Education of the public and employees was necessary to make it successful, she concluded.

Home Service Aids the War

McCall second award goes to Puget Sound company for maintaining helpful service on home equipment

PLENTY of work for the women to do. Home service, the Puget Sound Power & Light Co. has found, is needed in wartime more than ever in its history before. Therefore, it has kept its staff of home service women as near peace strength as possible and found plenty of work for it to do in connection with the war program.

Dividends? The company does not expect them. This they consider their duty and a wartime service. They will take their chances with public appreciation for this work when the war is over. Oddly enough, says Charles Hess, utilitization manager, this unselfish policy is yielding benefits even during wartime.

It was because of this policy and the program built around it that the second prize in the Laura McCall award for home service was given to Miss Edith Rauch, home service director of Puget Sound Power & Light Co. for the past year.

Despite efforts to keep the staff at full strength, the company has lost several girls. Originally there were 18 on home service and lighting. Of this original staff eight now remain and the force has been built again to twelve. Recruits are still being sought from the state colleges to keep the staff up.

During 1942, which was the period for the award, these girls made 6,000 individual contacts, gave 900 lecture demonstrations to 25,000 people. Each of the eight girls and director has held 112 lecture demonstrations, reaching 2,000 people. There were 750 people contacted per girl during the year.

In preparation for this, refresher courses were given on food preservation, nutrition, home lighting, appliance conservation and care. Being home economists with college degrees, the American Red Cross nutrition program in many instances was carried on by these girls. They also trained the Camp Fire Girls in nutrition work. When the University of Washington had its home economics round up, bringing in 300 Washington educators, the company was given a place on the program of nutrition training.

The Health for Victory program, the demonstration kitchens, classes for Army and Navy and Coast Guard cooks, a cooking class for the young men of the Y.M.C.A. and several children's classes were also conducted. Other educational work undertaken was that of training for a nursery school in eastern Washington, classes for Girl Scout troops, advisory work on dimout and blackout control, a "share the meat" project for high school students, the promotion of Victory gardens under the OCD auspices and distribution and showing of home planning films.

Present activity centers mostly in food preservation clinics where work is being done with the extension divisions of the universities and colleges. The women of the company team up with the faculty of these colleges and both do part of the demonstrations.

These food preservation clinics take up pressure cooking of the canned produce, the preparation of Victory garden produce for drying, the preparation of foods for frozen food storage and similar information. Help has been given to various agencies of the Department of Agriculture to set up canning centers in which organization work and supervision is furnished. When these are conducted in a school they are operated by the school home economics teacher but assistance is often given by the company's home service women. Work was carried on with the company's agricultural laboratory in developing the best means for drying apples.

When Frederick & Nelson Department Store in Seattle carried on a public canning demonstration July 7, 8 and 9, it was the home economists of the company who put it on.

Victory Kitchens

One of the steadiest and most consistent pieces of home service work has been that carried on at the Victory kitchen at 1908 Fourth Ave., Seattle. This is handled by the Seattle division of the company and directed by R. U. Muffley.

The Master Builders Assn. has a showroom at this address in which a model electric kitchen had been erected. It also contained builders' exhibits. The company needed a centrally located and fully equipped kitchen in which to present nutrition and food preservation courses. The General Electric Co. originally had the display. Through cooperation of all involved, the company took over this kitchen and has been operating it daily, working with the home making departments of Seattle newspapers, particularly the *Times*.

Red Cross, too, has made use of the kitchen for nutrition courses and canteen courses. The Health for Victory Club, teaching nutrition courses to various industries, also used this as headquarters.

Operation of this is pretty much a matter of showmanship. Variety is given to the program by having special meetings during the canning season or at various other seasonal events during the year, like Thanksgiving and Christmas. No prizes are given. Menus, however, are occasionally printed and given out.

Every Thursday but one during the past year has been utilized for the health for victory classes. The company's idea is that since it sells dependable service it must provide a dependable program which the public can rely upon from month to month. With the

Victory Kitchen in Seattle every day serves crowds of women who come to it seeking advice to adjust to war food restrictions and make appliances last

curtailment of motor vehicle use, users of electrical equipment are advised by advertising, radio, etc. that anyone with a problem can come to this center and ask questions.

To further this idea, the cashiers in the outside offices of the company were brought in to the kitchen and given a demonstration of its equipment. They saw and used the demonstration kitchen and were asked to sell the idea of its use to their customers who came in with questions on appliance operation. Display cards were provided these offices to publicize it.

Although the auditorium seats only 110, many times, such as at Christmas and Thanksgiving and at sessions on frozen foods, as many as 300 people attempted to crowd the room.

Much of the success of the operation comes from the variety given to the program. There are cooking days in which women are asked to bring in cookies to distribute to service men's clubs. Such other programs as the following have been very popular: "Meat Substitutes and Extenders," "Market Basket to Table in 45 Minutes," "Russian Day," "Chinese Day," "Apple Day," "Food Rationing in England." Besides the nutrition information talks are given on electric service, replacement of fuses, maintenance of cords and appliances.

Likewise, many evening meetings have been staged there for women who are busy during the day. This has been popular with store help and also among women employees of some of the war plants.

To paraphrase the old saying, "Man's work is from sun to sun, but home service work is never done."

Lunch Box Meals

Two bulletins for homemakers have been issued recently by the Westinghouse Electric & Mfg. Co. Home Economics Institute, as a part of its Health for Victory program.

A primer for preparing lunch box meals for war workers gives pointers on tools, night-before short cuts and ways of preventing monotony. Special chapters are devoted to the night-shift worker and the problem of overcoming food shortages and stretching ration points.

A 47-page Home Canning Guide, selling for 10c, includes in addition instructions for quick freezing, dehydrating, brining, winter storage in cellars, pits and boxes. The four main canning methods—by pressure cooker, oven or roaster, water bath and open kettle—are covered and hints are given for health and safety.

Howdy Stranger

Friendly greeting and help given war industry newcomers

HOW to meet and greet the many thousands of war workers coming into the territory it serves, has been a problem of the Washington Water Power Co. War workers who may have stepped from the pages of *The Grapes of Wrath* and families of prominence request electric service in steadily increasing numbers. Many of these workers are planning to be permanent citizens, and today a wide variety of questions is in their minds.

For instance, newcomers want to know why extensions for service cannot be made; why they cannot buy appliances; why the service man and repair man are delayed; why the company's collection policy is affected by the growing manpower shortage. In addition to these definite wartime problems, there is the matter of civility and friendliness by an electric service company to visitors from practically every state in the union. The Washington Water Power Co. believed that it could help civilian morale by doing something to welcome the newcomers, and by telling them about the locality to which they have come to live.

The month of April started the new program and a friendly welcome was extended to all new customers. The basis of the program was an informative booklet which bore the title, *Now That You Live Here.* Neighborhood representatives of the Washington Water Power, who were called to the homes of new customers to assist with service problems, distributed the booklet personally. In other instances, the booklet was mailed to new families. Current with distribution of the booklet, the company shaped its radio spots as messages of welcome, and its newspaper advertising further supported the program.

The company found little difficulty obtaining newcomer personalities to participate in the newspaper testimonial series. With rates in the company's territory among the lowest in the nation (the average residential rate being only 1.6c per kilowatt-hour) customers were enthusiastic in voluntary comments. Newcomer housewives did not hesitate to be photographed, and quoted in a newspaper ad, which incidentally gave information about the Inland Empire and about the company.

"I'd never cooked electrically before and expected a simply huge electric bill. But I am amazed and thrilled that Washington Water Power electric service is so cheap!" said one newcomer from Pittsburgh.

"Your prompt service and low rates are a revelation!" said another newcomer from Pearl Harbor.

"We like your low electric rates in the Inland Empire," say newcomers.

The booklet fully considered war economies in its make up. A colored stock eliminated special color runs. Inside the cover a message from the president explained the purpose of the booklet, and extended a personal greeting from the firm's chief executive. Pages that followed bore such titles as, "The northwest has world fame—welcomes you." "The Washington Water Power, a pioneer utility." "Many scenic spots are adjacent to our lines." "Famous industries served by W.W.P. electricity." "The source of your power supply, and arrangement with Grand Coulee." "Customers say that W.W.P. electricity is really cheap." "Twenty cents of your electric dollar goes for taxes." "The company contributes to the war effort." "The company wins coveted Coffin Award." "Inland Empire prefers business-managed utilities." "Helpful hints for electric service." "Your war bonds today buy electric kitchens tomorrow." "Short scenic trips you can take." "Map of the Spokane street railway system." "What the future holds for territory of the Washington Water Power Company."

Considerable favorable comment has been received from civic groups and from individual owners. The newspaper ads proved attention getters, and the booklet is a friendly method of extending a personal welcome to customers who are a long way from home. Special war, service and transportation features of the booklet have opened up the possibility of revising it for all customers.

Recess

Increasing difficult in getting prospective students to take the appliance repair training caused the repair class conducted successfully by the Northern California Electrical Bureau in cooperation with the San Francisco city schools to be recessed for the summer months. In September, when regular fall term begins at the Samuel Gompers Trade School, facilities will be available again but the bureau is seeking some method of guaranteeing attendance through cooperation of dealers by sending people they have already hired. Since October 1942, when the training started, over 50 trainees from the school have been placed in repair shops.

Short Stock

Odds and ends of sales news from today's market

A GLANCE into Maxwell & Frank's store in Spokane is the inspiration for this page. It, like all good electric stores, used to boast a proud display of modern electrical appliances, lamps, fixtures and supplies. "Look at this junk now," said its store personnel, pointing to mops, wax, remnants of kitchen gadgets still procurable, paint, leather goods. "The profit from the sale of one range in the old days would be more than the entire day's take-in from this little stuff." But Maxwell & Frank carry on. The wiring business has been excellent, repairs are under the supervision of Walt Maxwell and that business is rushed. The store location is worth keeping through the war even if it looks more like a variety store than an electrical shop.

Fred Wolters Electric Co. in Salt Lake City is one of that city's most attractive chinaware and gift shops now, with its electrical stock reduced to lamps and fittings and a few fixtures, moved to the rear to make room for the new wares. Anticipating the situation, Fred Wolters started his conversion program six months ago. Pictures and further details of that change will be told in a later issue. It is an excellent example of resourceful adjustment.

The Market wasn't what she used to be, this year in San Francisco. Lorenzo Richards of Boyle Furniture Co., Ogden, was there as usual, because he is a past president of the retail furniture association. Neil Petree, president of Barker Bros., Los Angeles and just back from a tour of duty with OPA as a consultant, was one of the principal speakers at the Industry Dinner, July 14. Louis J. Ruthenberg, president of Servel, Inc., was in town and asked to talk on the aims of the Committee for Economic Development. There wasn't an appliance (electrical) to be seen in the display space remaining in the Mart building after the government agencies had moved in, but there were some significant things about the whole thing. Here are a few of them:

Attendance was 20% smaller, said Frank Runyan, vice-president of the Mart, but seemed to represent as many firms. Available merchandise was generally dished out by manufacturers on an allotment basis. Best purpose of the market was to inform the trade as to realities of the situation, permit them a chance to ask questions, receive immediate answers and relieve the jitters.

Frank E. Marsh, regional administrator OPA, put it up to business men to see that price controls and rationing worked for they would suffer most from inflation. "We are all fighting for something you should hold dear—the opportunity of any American after the war to go across the street and start in business if he wants to."

Some civilian supplies may be expected, Leo J. Heer, vice-president of the NRFA said, since the reorganization of WPB's civilian supply division, but he cautioned against too much optimism about stocks. "I think you should be encouraged; but only if you are able to hold your optimism within strict bounds dictated by stern reality of what is and is not possible in a war economy." He urged a change in policy by OPA to make its freeze of prices not by industry averages but by each merchant's margin during a base period.

Servel is about to spring a postwar product for people to whet their appetites upon, Ruthenberg hinted, as he told how American industries were pledging production schedules and programs which would create millions of jobs for the returning soldiers and to return civilian economy to normal.

Petree talked of three responsibilities of retail business—1. Making itself heard in Washington and through Congress as to the necessity for maintaining a certain civilian economy. 2. Cooperation with the war agencies, practical cooperation with the men operating these agencies near home. 3. Having three types of plan ready for the three types of conditions which might prevail after the war. These are 1. boom—collapse. 2. collapse—boom. 3. long period of nearly normal activity.

Two forms of assistance are being given dealers in the Washington Water Power Co. region by Frank Tool's residential division. Training material produced by a national magazine, and the Kelvinator *Simplified Training Course for Refrigerator Service Men* are being obtained for dealers who want these. Information as to sources of parts, assistance in service training, priority and other information are also keeping this group busy helping dealers keep going. Customers are being offered simple directions for the construction and operation of vegetable and fruit dehydrators, too.

Three ways to preserve foods are advised by Idaho Power Co. in a series of advertisements—freezing, dehydrating, and pressure canning. The ads stress the danger of botulinus poisoning unless careful preparation is made, tell briefly what to do, offer booklets containing full directions. Earl Olson, manager of residential sales, says that the home service staff is very busy holding nutrition and food preparation classes. The domestic sales staff, who have no appliances to sell, are helping customers, especially the farm ones, to keep their equipment in shape, get repairs made.

A revised Electrical Appliance Parts Directory has been issued by the Pacific Gas and Electric Co., bringing up to July 1943, its previous directory. Printed as the other one was on heavy cardboard, it is designed to hang up in a dealer's store. Added to the list are appliance accessories and fractional horsepower motors.

Things you didn't expect to see—asking its customers who have desert coolers to turn them off in case the power supply shows a bump or shuts off, Central Arizona Light and Power Co., in advertising urges customers to help it over the hump of restarting the 20,000 or more cooler motors on its system. "It takes about five times as much power to start your cooler as it does to run it, and our automatic equipment just can't start 20,000 coolers all at once," the ad explains.

Warning its customers not to go into food dehydration unless they intend to work hard at it, Pacific Gas and Electric Co. advertised things to do and not to do when dehydrating vegetables. The step was taken to prevent wastage of good food by improper preparation for dehydration.

A department store, The Palace at Spokane, advertises that it will clean, adjust and repair vacuum cleaners. It even offers pick-up and delivery for its complete rebuilt, guaranteed job.

Still carrying the good constructive advice on use of home electrical equipment is August issue of *McCall's* magazine which tells how to "stretch your rations with your electric mixer" and tells also of savings with a waffle iron and toaster. These practical home economics hints are prepared by Kathleen Robertson and Harriet G. West.

Electrical League of Utah, says President Leland B. Flint, has organized a postwar planning committee, consisting of J. A. Kahn, General Electric Supply Corp.; Frank Bodine, Westinghouse Electric & Mfg. Co.; Paul Devine, of W. H. Bintz Co.; W. A. Huckins, Utah Power & Light Co. and J. Vernon Sharp, Sharp Electric Co.

Hons, in Boise, has become very much a music store. Its stock of electrical appliances gone, repair work on radios, records, and some furniture and musical instruments have been given a prominent place.

To back up the farmers who have

been deferred from the draft to do the absolutely essential job of producing food, Idaho Power has run some ads praising "the 21,669 Idaho men attached to the Farm Service Corps." The comparative importance of their work to that of carrying a gun is simply told. Despite these draft deferments, the drain on farm manpower in that agricultural state threatens to bring a food shortage this winter for lack of help to harvest crops.

Wayne Stillman of Radio Studios, Inc., Salt Lake City, has no radio sets to sell, but he does have radio parts. He recently bought out a radio parts distributor and is keeping local dealers supplied with as many parts as he can get for them. The company's store in Logan, which had furniture too, has been closed and this stock has been sold. Blankets, gas ranges, oil heaters and other lines serve to fill out the diminished appliance stock.

Brown-Johnston Co., Spokane, has so many activities that, while the store, the pride of Mrs. Johnston in former days, doesn't resemble itself anymore with its stock of housewares and garden supplies, the wiring department has been doing huge war plant construction jobs in team with Tinling & Powell. The lamp manufacturing department has grown into Columbia Manufacturing Co., making war materiel, and Eric Johnston, its proprietor, is often away on international and national affairs as president of the Chamber of Commerce of the U. S. J. F. Boothe, store manager, says the fixture stock is nearly sold out, there is only a fair stock of lamps, ranges and refrigerators are all gone, but repair work is booming. This, he says, is restricted to the lines they carried. There are girls working in the repair department. Of the floor merchandise Boothe says, "Being located near Sears Roebuck people come in here looking for the variety of stuff they carry. Well, to look at our stock, maybe we *are* carrying it."

To catch up on the volume of repair business piled up, several dealers in San Diego, according to J. Clark Chamberlain, manager of the Bureau of Radio and Electrical Appliances, are playing possum. One puts up a sign, "open at 1 p.m. daily". Another puts up a "shop closed" sign each Monday and Tuesday. Some put up notices that no new repair work can be taken before a certain date. With their shops closed to interruptions, they work hard to catch up on the accumulated work.

Where are those stoves that were to be rationed? So far none have been released, despite OPA's tour telling of the program. Customers are mad because they have heard about them and dealers have to tell them a PD-851 application is still necessary. Dealers have been asked to submit sales and inventory figures. Quotas are to be based on such figures, so it is important that they be expedited.

Absenteeism in war plants is being caused by the laundry situation—both domestic and commercial. Such war production centers as San Diego have had thousands of families flock to them within the past year. None have been able to buy washers or electric irons for a year. Laundries have been so piled up with washing that they are refusing more work or customers. Desperate, women workers have to take days off from work to catch up on clothes, laboriously washing by hand. Strong pleas are being made to Washington from the chamber of commerce and the Bureau of Radio and Electric Appliances for a limited manufacture of victory models to be sold only to those in such desperate need.

Trading Post

Utah dealers offer public a method of swapping appliances

To bring unused electrical appliances out into the open so that those in need of them may be able to buy, the dealers in Salt Lake City and Ogden and Utah Power & Light Co. are conducting a "Wartime Trading Post." It is still in its initial and, therefore, experimental stages but the response so far has been promising. Of course, the "want to buy" inquiries exceed the "want to sell" in about three to one ratio, and in some cases where appliances were offered for sale they were snapped up within 15 minutes.

Largely a goodwill builder on the part of dealers, its chief value being to keep their name identified with electric appliances, the activity nevertheless has the support of 25 Salt Lake City dealers whose names are carried on the power company advertising. A similar response has been had from Ogden dealers.

Dealers operate as sales agents or sources of information for the persons wishing to sell, buy or trade used electrical appliances. Utah Power & Light acts as a clearinghouse, forwarding whatever information it receives to local dealers. In some cases it brings inquiring buyers, sellers and traders together.

Supporting the activity advertising in about 60 newspapers, twice a month in city dailies, once a month in weeklies, in each case listing local dealers who are volunteer traders. A coupon is carried in each ad. In it the user indicates whether she wants to buy, sell or trade the appliances she lists and their approximate value, giving her name, telephone and address. The listing is for 15 days. If appliances remain on hand longer it is urged they be relisted. The coupon says that it will be turned over to a dealer to assist the respondent. Many responses have been phone calls.

Dealers are also supplied 14 x 22-in. store and window cards. Full returns are not yet available but there were 92 inquiries from dealers in two cities. Company offices reported 346 coupons and phone calls. The activity started June 1 and is beginning to get under headway. Dealers like the idea and both W. A. Huckins, sales manager, and J. F. McAllister, manager of residential sales of Utah Power, feel that it will render a necessary service to all concerned.

Appliance repair schools like this one by Kelvinator at Preston, Idaho, are being conducted by manufacturers and Utah Power & Light Co. in that region

Did you know

these changes in materials regulations of the month?

FRACTIONAL horsepower motors do the millions of little jobs which electricity is called upon to perform. They do the same types of little jobs for thousands of war machines and devices, so the full capacity of motor manufacturers for small motors is being diverted to war production. Meanwhile neglect, overloading, wear and damage are decimating the existing small motors. In the past it has been cheaper to replace than repair. Rewinding of fractional horsepower motors cannot be done profitably except on a mass production basis, especially at high wage rates. Ceiling prices for repairs have automatically frozen repairable small motors into storage. Yet the need for them grows more critical every day.

National Industrial Service Assn. is seeking to help the War Production Board do something about this crisis. It has sent a questionnaire to motor dealers looking toward concentrating enough fractional horsepower motor business with a few shops to make production methods pay. Manning the Used Electrical Equipment Dealers Industry Advisory committee, a campaign is on to scrap unrepairable and hopelessly obsolete motors. It is asking dealers to interchange stock lists. It recommends cutting the number of lead wires. Rebuilding materials are available on CMP-4B without obtaining ratings from customers.

Sale of a small motor to replace one broken down is considered a repair transaction if the old one is taken in, according to a July 1 ruling.

Arizona reports that permission has been obtained for 16 local manufacturers to make 16,000 desert coolers out of materials on hand which are to be sold under ceiling prices only on PD-1A applications to war workers or persons of ill health.

Conduit, metalic tubing and raceways were further restricted in manufacture by an amendment to L-225, June 24. Only installation change was removal of "damp locations" as defined in the Code from the list of exemptions, and restrictions to raceway installation.

Copper wire shipments will be more realistically permitted under a July 17 amendment to CMP-4. The limitation of 500 lb. of one item that can be shipped at one time has been deleted and purchasers may get delivery from a warehouse of 3,000 lb. of copper of one item during a calendar month instead of 2,000 lb.

Construction was put under the Controlled Materials Plan by the issuance of CMP-6. However this does not eliminate the necessity for obtaining authorization to construct under L-41 and applying for materials from WPB. It changes the procedure by which materials are assigned to major construction contracts through prime contractors and projects approved will bear allotment numbers. The full details of the plan should be read carefully by all in the construction field, contractors and suppliers.

Relief from construction price ceilings that are too low may be sought by individual adjustment with regional OPA administrators. Local orders or regulations applying to a group or class of sellers may be issued now by regional officials. This is contained in Amendment 2 to MPR 251, July 12. OPA is holding conferences too with contracting groups to prepare regulations to substitute for MPR-251 in building repair and maintenance.

A construction guide has been prepared to help contractors keep in line with the revised version of the "Critical Construction Materials" list. Formal instructions to be thus guided are incorporated in Form WPB-617, formerly PD-200. A supplementary *Design Guide for Interior Electric Lighting and Wiring for Wartime Construction* was released at the same time and is discussed more in detail elsewhere in this issue.

Wire for farm production uses was dealt with from two directions during the month. One was by the Office of War Utilities, which reviewed its policy on rural line extensions longer than 5,000 ft. A separate article in this issue gives details of that. The other is a provision for farmers to obtain copper wire for farm production purposes under the Controlled Materials Plan as part of the allotment of copper made to the U. S. Dept. of Agriculture. This is separate from the previous order under which farmers may obtain up to 75 ft. of wire by certifying it is to be used for farm operations. In the former the farmer who is eligible under U-1-c or who has service may apply to his county war board for the wire. If his application meets WFA standards he will be given a copper wire allotment certificate which must be presented to a supplier within 10 days. Suppliers may replenish by extending these certificates. Maximum wire for any presently unserved farm is 75 lb.; for farms now having service 50 lb. None of it may be used to extend service to dwellings. It must be to produce additional food or save farm labor.

Hand tools may now be obtained by an employee under specific circumstances by extending his employer's CMP-5 ratings for maintenance, repair and operating supplies. The employer may buy and resell to the employee or the employee may buy with a certificate filled out both by himself and the employer. This is contained in Direction 9, dated July 9, and includes a form to be used.

Welding equipment standing idle is to be found first if possible before new welding equipment will be issued under a new order L-298, July 12. Equipment is considered idle if it has not been used for welding more than 120 hours in a period of 90 consecutive days. Owners of idle equipment are required to register it on form WPB-2732.

Electric fuses are further limited in the use of copper or its alloys by interpretation No. 1 to L-161. Prohibition of copper is made for metal exterior threaded ends attached to the fiber of renewable fuse tubes and washers to hold the fuse links. Only actual essential current carrying parts may be of copper.

Power switchgear was ordered to conserve metals by operating current carrying parts at higher current densities, eliminating and reducing steel gage on enclosures, use of wood for outdoor substation structures and eliminating duplicate connections, etc. Non-essential tests are also ruled out.

Commercial refrigerator reconditioning was given a ceiling price of 75% of present list price for new parts or subassemblies by OPA in order to cover rebuilt parts and subassemblies not made before March 1942. This is contained in Order 555 under GMPR, June 25.

Refrigerants (Freon) were put upon a control basis which eliminates their use in equipment used for cooling beverages. Eight classes of users of the gas are designated by order M-28 as amended July 10. Supply of Freon for replacement in a refrigeration system is designated to be based upon the class of use. Comfort cooling and beverage cooling are at the end of the list.

Vacuum cleaner attachments. OPA ruled, are also under price ceilings, even used ones. Amendment 2 to MPR 294, July 3, clarifies this question.

Gas ranges, OPA warns dealers, should not be bought at inflationary prices, even if used, because a ceiling will be set on them when rationing starts which may catch the buyer short.

During the month several industry advisory committee meetings between WPB and industry groups were held.

Critical Materials in Wire and Cable

What materials are scarce and why, what substitutes are being used, what the outlook for the future is in respect to wiring materials

Austin Dunham*
District Manager
Anaconda Wire & Cable Co.,
Denver, Colo.

WARTIME restrictions have resulted in some startling and epoch-making developments in the electrical wire and cable industry. Many materials used in peacetime happened also to be critically needed for war, and the supply was unequal to war demands.

As a result our entire available research staff had a major job to perform and the results attained to date, with the cooperation of the various suppliers, has been a most creditable performance. Our laboratory and factory men have labored night and day with the most perplexing problems imaginable. New and untried materials had to be developed overnight. Inability to get new machinery meant redesigning and rebuilding of available machines for entirely different uses. The outcome has been one more tribute to the great American will to find a way—and do it. The accompanying table lists critical materials, tells how they are normally used, and what alternates have stepped into the breach of wartime restrictions. Naturally, some materials are under less restriction than others and, although a few are under no WPB restrictive rules as yet, the amounts available are such that they have to be allocated, and that, of course, is about the same thing.

Various changes were made necessary in electrical wire and cable products. Some of these forced the development of new products, or alternates, which are really superior and point the way to beneficial changes after the war. Any of the alternates are easily "good for the duration." In some cases a little change of technique in installation and operation is necessary. But most users are equally as resourceful as are the manufacturers' designing engineers.

Step by step, WPB restrictions have tightened so that now, under the CMP (Controlled Materials Plan—affecting at the start principally copper, aluminum and steel, but later probably other critical materials), manufacturers' inventories have to be drastically held down and exact scheduling of future production is essential. Consequently, users also have to plan equally far ahead and place orders early.

Bare Copper Wire and Cable

The copper shortage is so acute that little need be said here on that score.

But, *so far*, neither the quality nor construction of bare wire and cable has had to be altered. The same conductivity, stranding, shapes and sizes are available as heretofore. However, mill production limitations have frequently forced stranding substitutions (such as 7-wire for 19-wire, 37-wire for 91-wire strand, etc.) and users may find this increasingly necessary as bottlenecks develop; also, solid wire has been increasingly substituted in control cable instead of 19-wire or 7-wire strand. A "simplified practice" study is under way by WPB which, if adopted, at least would limit the number of wire sizes and variety of strandings—for noncombat items at the start.

Alloy wires require casting, hence this bottleneck should be most carefully avoided wherever possible—long deliveries are inevitable.

Weatherproof Wire and Cable

What has just been said holds regarding the copper wire and strand.

The coverings still available are either paper, such as Anaconda Duraline, or all cotton, or jute and cotton (on some larger sizes), all properly treated by "URC" weather-resisting, processed compounds.

While restrictions have been placed recently on shipments of asphalts in tank cars to the eastern seaboard (because of the fuel oil and gasoline shipping situation) this in no way restricts, as yet, supplies for weatherproof wire and cable.

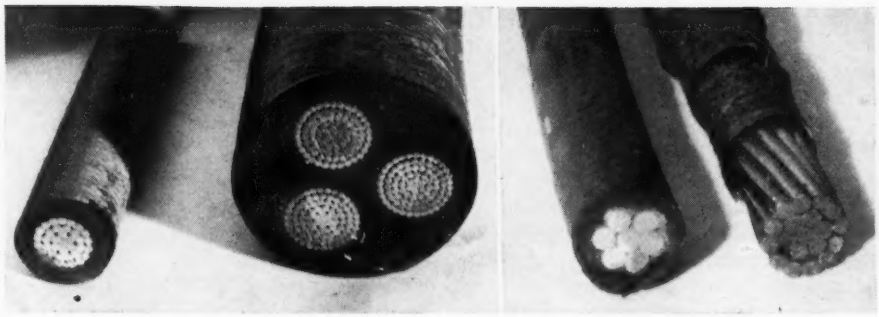
The paper used in such wires as our "Duraline" is now (and later likely to be) less critical than cotton, hence, it has become the preferred ma-

RESTRICTED MATERIALS

Used in bare and insulated electrical wire and cable

Metals	Under Priority or Allocation	Where Used	Alternates Available
Copper (and alloys)	Yes	All bare and insulated—pothead parts	None
Tin	"	Conductor coating and in solder	Lead alloy
Lead	"	Sheathing and conductor coatings	None
Steel	"	Armoring—parkway and submarine cable—compound buckets	Two jutes on parkway Bags for compound
Iron	"	Pothead bells	None yet
Insulations			
Rubber	"	Building wire, power cables, signal cables	Plastics VC, paper
Varnished Cambric	No	VC power cable	Paper-lead (H.V.)
Paper	"	Paper-lead power cable	None
Plastics	Yes	Building wire	None
Jackets			
Neoprene	"	Instead of lead or rubber jackets	VC lead and jute
Plastics	"	Instead of lead or rubber jackets	VC lead and jute
Fibers			
Cotton	No	For tapes and braids	None
Silk	"	For tapes and braids	None
Rayon	Yes	For tapes and braids	None
Jute	"	For spiral wrapping (and some braids)	Heavy cotton
Sisal	"	For hard braids	" " (or jute)
Saturants			
Oil	No	Paper-lead (and VC)	None
Asphalts	Yes	Braids	None

* As presented to the meetings of the Rocky Mountain Chapter, the Montana Chapter and the Utah Chapter, International Association of Electrical inspectors in March and April.



Stranding substitutions—37 wire, (at left) for 91 wire as in the 3-conductor cable; 7 wire for the 19 wire strand

terial both from the standpoint of quality and availability.

At times, not due to basic cotton shortage, but to the abnormally heavy demands on yarn mills for war needs, two-ply cotton has not been easy to get in all sizes and if this situation continues or gets worse, customers may have to be contented with single ply—and probably be glad to get it because, in our estimation, it really does not affect the quality of the product.

Tin Coated Wire and Strand

Early in 1942 when the tin shortage became so acute, WPB restricted the amount of tin in our products to 50% of that used per quarter year in 1940. Hence, we had no alternative but to convert over to 100% Anacondaloy, a lead alloy, on civilian products and await further WPB rulings as regards the use of pure tin or lead alloy in combat articles. Most other large wire and cable users, such as Okonite, General Cable, Habirshaw, etc., have followed the identical procedure. WPB expressed gratification at our action.

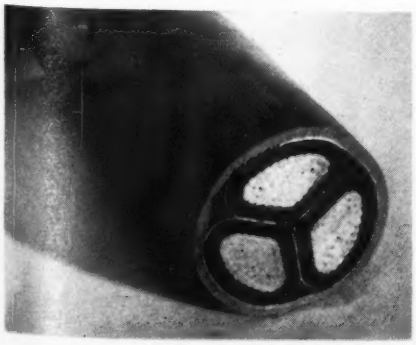
WPB is considering amending order M-43 of Jan. 9, 1943, and temporary appeals have been granted—

1. To permit No. 20 AWG and smaller sizes to be tinned even on non-combat products.

2. To permit apparatus manufacturers such as Westinghouse and General Electric to buy alloy coated conductor even on varnished cambric cable and on rubber cable where there is a separator over the conductor such as cotton or paper (this is an exception to Paragraph No. 11 of M-43), but, because of the dire necessity of conserving tin, these appeals may be cancelled in the new issue of M-43.

The American Society for Testing Materials—the national authority on such matters—promptly wrote "Emergency Specifications for Lead-Coated and Lead-Alloy Coated Copper Wire for Electrical Purposes" (ASTM Designation Es-1) issued March 29, 1942.

Paper insulated lead covered cable



This specification defines the percentage limits of materials that may be used and also defines the methods of sampling and testing. This is what we carefully follow.

Then the Navy and Army Departments in Washington rapidly followed suit, providing for the use of the ASTM specification material abovementioned, in practically all war products. Some exceptions were necessary, i.e., most wiring in airplanes and tanks still requires tin because of the many complicated soldered connections subject to extreme vibration during operation.

Except for *actual combat use,* the latest WPB rules (1) prohibit the alloy coating from containing more than 12% tin and (2) only permits its use with rubber compound when in actual combat. This rules out tin or alloy on varnished cambric or synthetic or where a separator (like cotton or paper) is used over the conductor under the rubber, unless the customer makes an appeal and gets an exception.

This lead-tin alloy coating is naturally not as bright in appearance as pure tin, but it is claimed to have better corrosion-resisting properties and a longer protective life than pure tin. These were its claimed advantages even before the war.

Naturally, there are some slight disadvantages which require a different technique by the user in handling alloy, namely, soldering must be done at somewhat higher temperatures, but workmen in the field have generally acquired the new technique without much difficulty. (Most soldering difficulties have been identified with the lean tin in the soldering stick rather than the wire coating). Also, many joints and terminations are now made by compression connectors anyhow.

Of course, constant research and development is under way and new technique in time will solve any special applications which may now seem somewhat difficult.

Rubber Insulated Wire and Cable

Crude rubber is another scarce material, hence, WPB immediately had to issue order M-15-B. The most important amendment, No. 12, issued March 25, 1942 (to supplementary order M-15-B-1) included restrictions for the manufacture of rubber insulated wire and cable for "nonwar orders;" limited the rubber content of each rubber insulated type and established what is known as "List 12" for the wire and cable industry.

It is *most important* that you read the last amendment to Rubber Order M-15-B-1, as amended Dec. 28, 1942, and effective Jan. 11, 1943. For convenience company publication C-52 contains this and includes reference to the latest WPB restrictions as to (1) no rubber on neutral wire and (2) the use of rubber-faced and rubber-filled tape. No such tapes are permitted over the rubber compound on individual conductors or as a binder tape over insulated conductor assembly.

Stocks are reasonably ample but these will have to be carefully conserved because even with the excellent substitute tapes, quickly developed to meet the emergency, some of the better ones react unfavorably to the latest anti-oxident rubber compounds, and hence the older tapes are necessary, pending further improvements. Thus for a time some constructions may have the old type of tapes and some the new. Also, the newer tapes are not available as yet in colors, but some method of conductor polarity identification likely will soon be designed.

Even now the available stocks of crude rubber (and reclaimed too) are variable in quality. Also, rubber compounds are a complex chemical mixture. Our engineers have been extremely resourceful in maintaining exceedingly high quality standards in making rapid and frequent changes to conform to WPB rules and the scarcity and changing quality of whitings, clays and other numerous chemical ingredients. How long this can continue nobody knows. The WPB compounds (W-A, W-B, etc.) only set the permissible rubber content *(volume, not weight).*

The American Society for Testing Materials, long the authority on composition, performance and other tests on rubber compounds, is frequently adjusting its nationally known standards to match the newer restrictions. But obviously, this rather slow process

is likely to have a time lag and that is exactly what is happening now. In the WPB compound set-up, such standards as ASTM-D-353-1941 and ASTM-EA-D469 are mentioned opposite W-A, ASTM-EA-D-353 and D-374 opposite W-B, etc., but these are largely *guides* and while these specifications can be met completely right now, no one can possibly guarantee that each and every test provision will always be met week after week and month after month.

In fact both ASTM and the Underwriters have been making repeated downward amendments to the published test requirements of their specifications. Hence, it is very important that no commitment be made to supply anything other than the very latest provision. The "EA" means an "emergency alternate" has taken place by a reduction in such features as tensile strength, insulation resistance, etc.—and already new amendments are out to ASTM EA-469 and Underwriters RH. Others are likely to follow as available materials get more scarce.

Customers will have to be reasonable and tolerant. Our designing engineers are doing a truly remarkable job, deserving of every consideration all around. Every product we turn out is a good *usable* product—which is, after all, what the customer wants.

Every quotation we make and every order we fill is conditional on the very latest WPB rules. No one should forget that for a minute.

Rubber Alternates Available

A. *Synthetics*—With rubber increasingly scarce, we immediately look for substitutes and alternates. Fortunately, plastics were coming to the fore rapidly just before the war. They are termed polyvinyl chlorides. Our trade name is "Densheath." The Underwriters gave approval in the 1940 Code to "Type SN" (synthetics) with light walls for rewiring in existing raceways. Since then the use of SN has increased very rapidly not only as building wire but for machine tool wiring, switchboard wiring—and, since the war started, also for Army and Navy uses. Its use so far has been limited to 600 volts, with minor exceptions. (For Neoprene—see "Jackets" later in the text.)

B. *Varnished Cambric*—For many power cable sizes No. 8 and larger, VC-*braid for dry* locations and VC-*lead for wet* locations is a safe and popular alternate for rubber. It is rated at higher operating temperatures than most grades of rubber insulated wire and is used frequently up to 15,000 volts (occasionally even up to 28,000 volts). VC in sizes No. 14 to No. 9 inclusive, has lately been frequently used also as control cable (usually multi-conductor).

C. *Paper-Lead Power Cable*—In power sites, especially where 1/0 and larger is called for, as VC has followed rubber in bookings to tax mill capacity, paper-lead has been more and more frequently selected. It is usually able to carry more load than rubber and operates at higher temperatures, but must always be lead-covered. Where lead corrosive conditions are feared either for paper or VC-lead, asphalt and duck tapes can be easily applied over the lead at the mill.

Varnished-Cambric (or Varnished Cloth) Insulated Wire & Cable—As yet, there has been no restrictive ruling on VC tape. However some of the chemical ingredients have not been easily obtainable by the VC tape producers. Ingenious adaptations of substitutes and alternates have, generally speaking, kept up the quality of VC tapes, although no one can honestly claim these are certain to be as good and as uniform as prior to the war; but the safety factor is so great that, at least so far, no decided deficiency has become apparent.

The rubber restrictions forced a large switch-over to VC insulation from rubber insulation. Then on top of that, the vast increase in electrical apparatus demands for war plants and combat articles added much more to the enormous demand. As a result, the VC tape manufacturers were unable to step up their output to meet the combined new, extremely high, demands. Waiting for new, slow delivery machinery caused certain dips in supply of VC tape late in 1942 and early in 1943 and, while this has apparently been overcome now, there is still a tendency to lag behind the extremely heavy demands. This naturally upsets any too sure scheduling; also, VC insulating capacity at our mill faces periodic peak demands, which again push ahead deliveries.

The oil slipper compound used between layers of VC tape, depended on for bending lubrication at all voltages and extra insulating value at higher voltages, cannot always be secured under war conditions in the same high unvarying quality, but fortunately we have excellent treating facilities which completely satisfy the need (especially for higher voltage cables).

Paper Insulated Wire & Cable—Paper is mostly used in wire and cable manufacture in tape form to build up layers of insulation, then treated with oil in impregnating tanks and lead covered. While some types and kinds of domestic paper have been approaching priority from time to time, no WPB rules have had to be necessary as yet. It is true that for extremely high voltage cables, Swedish wood pulp paper for many years was preferred. However, inability to get the latter forced investigation and development of a domestic wood pulp paper, and this has produced extremely satisfactory results, even to the possibility largely of replacing Swedish wood pulp paper after the war.

While available mill capacity became quite heavily booked up because of rubber shortage and consequent VC bookings and likewise greater use of paper-lead cable (Lend-Lease demands also contributed to the demands) some capacity is still available in larger sizes. This condition, as with all products, will vary from time to time.

So much for various major products, except magnet wire, and their general availability and alternates. The following will analyze metals, insulations, fabrics and oils and saturants, where they have not already been covered in the preceding pages. Copper and tin have thus already been covered.

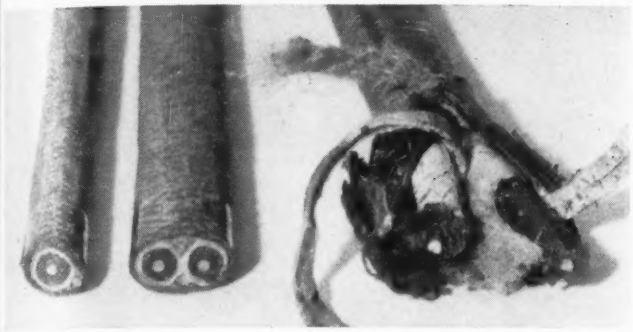
Lead—While listed in the preceding table as a priority material, actually, so far the domestic and Mexican supply has nicely met the need.

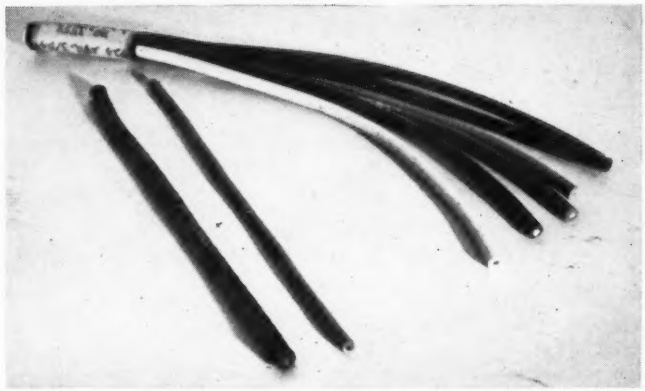
However, for the duration we decline to supply lead sheath alloys (like 2% tin or ¾% antimony). Both tin and antimony (especially tin) are scarce materials and should not be used except where absolutely necessary. Anaconda copper-bearing lead, still available, has a fatigue limit nearly as good as 2% tin and hence is vastly better than the old so-called "plain" lead and hence is recommended for the duration. It will give an excellent account of itself. More important, too much valuable production time is lost in cleaning out the lead press and melting kettles for alloy mixtures. Also, there is a very serious danger of blowing out lead press packings at the higher hydraulic pressures necessary with alloy mixtures and having the press out of service probably for weeks before repairs can be made.

Steel and Iron—The flat steel tapes—plain or galvanized—used as armor on "parkway" rubber-lead, VC-lead or paper-lead cables are procurable, but usually have to be carefully scheduled ahead, certainly under the CMP. The steel scarcity has led to the vastly increased use of two impregnated jutes over the lead. Such cable, protected with creosoted planks over it in the trench, will give satisfactory service for the duration in most cases. A very large number of such installations had been so made even before the war.

The same scarcity exists with respect to the wire armor for submarine and borehole cables. While no substitute is available for wire-armored submarine cables, for borehole jobs rubber-insulated non-lead Duracord cables are now largely used, suspended by the

Non-metallic cable with bare neutral, with weatherproof neutral (below). At right No. 14 code wire and SN wires





copper conductors from suspension units.

Steel also was used to make one-gallon and two-gallon buckets in which to ship asphalt joint-filling compounds, (like Superseal No. 150,) but only on war orders can these now be obtained. Hence, we have developed a heavy, chemically-lined paper bag which serves very well, although for hot climates steel still may be necessary. Also, for lighter-body flushing oils (like Superseal No. 240), a cardboard, lacquer-lined container has been developed much like those your automobile service station is now getting.

The bells of potheads are mostly cast iron, under priority of course. No satisfactory substitute has been developed as yet.

Jackets—WPB months ago definitely ruled out rubber jackets for the duration except for certain permissible uses. Consequently there has been a tendency to go over to neoprene or plastics.

Neoprene, while having high tensile strength, can hardly be expected to stand quite the same abuse as the tough-wearing rubber jackets previously supplied. Neoprene is more adapted to a fixed location where it is highly resistant to oils, acids and alkalies. In these respects it is much better than rubber. But although the large chemical companies, with government support and pushing, have stepped up their original production and are adding new plants as rapidly as possible, the supply is far short of the extremely heavy demand. Hence most of that available has to go for war implements. Beyond that, the jacketing capacity available throughout the United States is far short of the demand and consequently deliveries are much delayed.

This in turn leads to more frequent calls for synthetic jackets but these have a decidedly lower tensile strength and there has been less field experience than with neoprene and consequently a more cautious attitude is necessary as to where and how synthetics such as Densheath may be used as a jacket. Also, it should be borne in mind that there is a limiting high and low temperature for all plastics.

Jacket Alternates

Again, frequently, the user has to go back to VC-lead for conductors in duct and with two jutes thereover if for burial in the ground. If the load is large enough and the sizes 1/0 and larger and VC is booked too far ahead, then paper-lead may be used.

Cotton—Fortunately, no restriction has yet been placed on cotton, and hence it is just as freely available as heretofore for tapes and braids. However, as stated above, rubber for tapes now has been denied and cotton tapes have to be treated differently or be replaced by something else available. Certain sizes of cotton, however, have been bottlenecked, and this has led to the substitution of sizes and numbers of ends, as and when available to supply braids. This would apply equally to weatherproof wire and cable, as well as to rubber insulated wire and cable coverings.

Silk—of course, is so scarce that it is off the market for all intents and purposes. Consequently rayon has been the usual substitute for silk and hence a WPB order was necessary to control this application. Sufficient supplies have been obtained for the rather limited use we have to make of this material.

Jute—This has been used mostly in spiral wrappings over the lead, under armor and over armor, but occasionally for braids. Since jute came largely from abroad, WPB has had to put it under definite rulings. However, reasonable supplies have been available, although the processing mills occasionally have held us up for some specific sizes and then other sizes have had to be substituted, if on hand. That situation may become more acute; if it does, the alternate would obviously be heavy cotton.

Sisal—comes from Java mostly and is so scarce that it is not obtainable now. Where it was used for hard-wearing outer finishes or braids, we have had to substitute jute braids or seine twine braids, obviously not as hard-wearing in service but good for reasonable duty.

Saturants—As yet no priority has had to be applied to the oils used in impregnating paper-lead power cable or as a "between-layers" in VC, but obviously the rush in refining and handling of oils and the hurried shipment and handling cannot fail, generally speaking, to lower the quality of the stocks received. However, fortunately in our own case, this so far has not lowered the quality of our paper-lead power cable because we have had at Hastings-on-Hudson what amounts to an elaborate miniature oil refinery.

We continue to impregnate—not just saturate—our jutes as heretofore, which adds materially to the protective life of the cable.

Asphalt—is used in connection with the manufacture of weatherproof wire and weatherproofed braids for rubber insulated and VC cable, and for pothead and joint filling compound.

Cautions and Advice

The constantly changing picture of availability of materials that are used in insulated wire and cable dictates that your customers be diplomatically guided into the realization that:

(1) substitutes and alternates must be recognized as unavoidable,

(2) that all of these materials, especially rubber compound as supplied in the finished product, cannot possibly have all of their peacetime characteristics and

(3) that sometimes the so-called "substitutes" or "alternates" that are now developed or are being developed are really superior in some respects to the prior article supplied.

Customers should scan very carefully the conditions under which they intend to install wire and cable, be particularly careful not to apply non-lead products where lead-covered might, for wartime, be the better to use, and consult their manufacturers freely for advice where any question of adaptability exists.

LIGHT for an AUDITORIUM

Incandescent

Who

Auditorium of the Allan Hancock Memorial, University of Southern California, Los Angeles. Architect, Johnson. Mechanical engineer, Ralph Phillips. Lighting engineer, F. K. Sampson. Equipment made by Wagner Woodruff.

The Need

To provide soft, well diffused light for the auditorium and illuminate the photo murals on the side walls.

Conditions

Room is 45 x 70 ft., with a 22-ft. ceiling. Ceilings and side walls are light tan. The stage is in addition to these measurements and lighted from overhead sources.

Installed

Six pockets in the side walls, mounted 9 ft. to the top of the pocket and 23 ft. apart. Each pocket contains two 1,500-watt P.S. 52 lamps in Paracyl reflectors. The reflector opening is covered with a decorative louvre. The entire system is on dimmers which provide flexibility and smooth control.

Results

Maximum intensity, very evenly divided, is 18 foot-candles.

LIGHT without CEILING

Fluorescent

Who

Scott Motor Co., Reno, Nev. Installation by H. E. Saviers & Son. Fixtures by Globe Mfg. Co. Lighting engineer, Fred Steiner, Jr.

The Need

Adequate lighting for clerical work in an office partly partitioned off from a high ceilinged show room, partly under a balcony.

Conditions

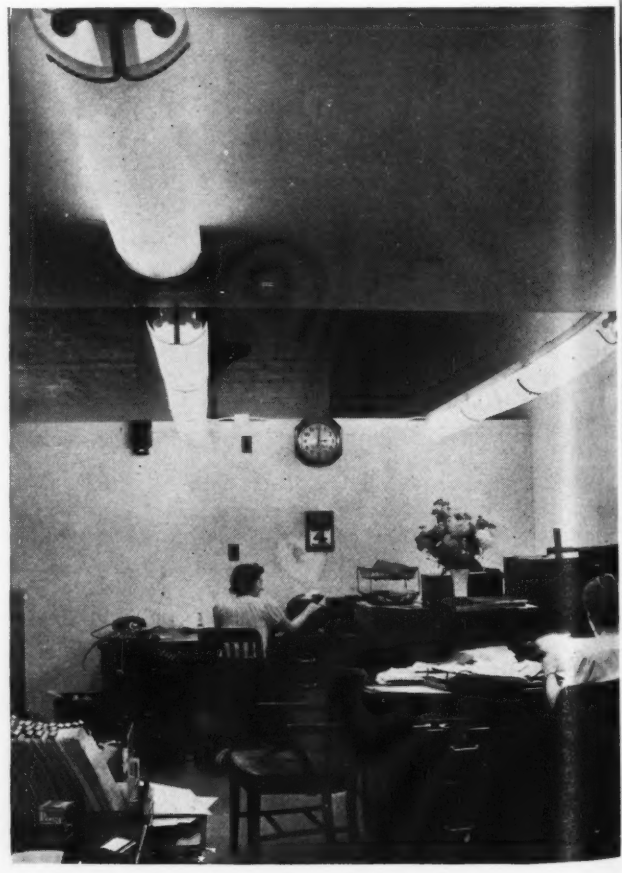
Office space 13 x 10 ft., half of which was under a balcony making an 8-ft. ceiling, the other half in the open under a high showroom ceiling lighted with a few large ornamental fixtures. Walls painted light cream color.

Installed

Fluorescent lamps, total 800 watts, 40-watt each, in fixtures containing two lamps each covered by a half circle of translucent glass. Fixtures mounted in two rows of four. One of these was under the balcony against the ceiling. The other three in each row were mounted on a channel iron support spanning the open space between the balcony and the outside partition of the office.

Results

Illumination level at desks 60 foot-candles after 100 hours burning.



EMEA *Dope Sheet*

Load Center Unit Substation
Part II

W. H. Shiek
General Electric Co., Los Angeles

DESIGNING electrical distribution systems with a reduction in copper content as the primary objective is a new approach to many in the industry. Major savings can be affected by following these fundamentals—learned from an intensive study of plant layout.

1. *Cover as much distance with high voltage and as little with low voltage as possible.* The amount of copper required to transmit 1,000 kva. at voltages ranging from 13,200 to 480 volts varies from 100% at 13,200 volts to 5,700% at 480 volts. This is not so staggering a differential when a person considers that it requires one No. 6 cable per phase at 13,200 volts but six 250 mcm cables per phase at 480 volts, to transmit 1,000 kva. comparably. In many cases voltages below 600 volts have been used to transmit large blocks of power for several hundred feet, where voltages of 4,160 or even 13,200 volts would have been thoroughly practical. By using the higher voltage as much as 98% of the copper in the cables may be saved.

2. *Locate the substations at the center of the load area.* In systems with the substations located outside the working area, 50% to 75% of the total copper required is for low-voltage feeders. Simply moving the substation to the center of the load area reduces the low-voltage feeder length by an average of 33%, thus reducing the total copper requirement by about 10% to 40%.

3. *Use small size substations.* By using, for example, four small substations rather than one large substation to serve a square load area, one-half of the low-voltage feeder copper can be saved. There is, however, a limit to the desirable reduction in ratings, for as the size is reduced, more material is required for high-voltage feeders and less efficient use is made of the material for constructing smaller substations.

In general, the optimum rating of a substation with 480-volt secondaries will be from 500 to 1,000 kva.; for 208/120-volt or 240-volt secondaries the optimum rating is 300 to 500 kva. three phase.

To obtain the benefits of load center distribution requires that the substations be located at the center of the load area and this often may mean right in the working area. Compact, enclosed substation equipments that utilize non-inflammable liquid for transformer cooling and insulation can now be installed in working areas without vaults. These units can usually be located on balconies, along building column centers and in similar areas of minimum value as working space. In any event they occupy an area of only 1/10 to ½ of 1% of the total floor space of the plant.

4. *Distribute power at the highest practical voltage.* By selecting the highest practical primary (2.4 kv. to 15 kv.) and secondary (600 volt and below) voltages, a large percentage of the copper required for feeder cables can be saved. Again a practical example; to carry 150 kva. three phase at 208 volts requires three 500 mcm conductors weighing 4.6 lb. per ft. and at 240 volts, three 400 mcm conductors weighing 3.78 lb. per ft., whereas at 480 volts three 2/0 conductors, which weigh only 1.2 lb. per ft., will do.

5. *Use cable with high temperature insulation.* There has been an amendment to the 1940 National Electrical Code which will be effective only for the duration of the war which allows code-rubber insulated cables to be applied on the basis of the higher current carrying ratings of the 1937 code.

6. *Use simple electrical distribution systems.* In general, it is axiomatic that the more complicated the distribution system, the more copper is required to carry a given kva. load. It is often said that extra complication is necessary to give satisfactory service reliability. There is actually so little difference in the service reliability of the simplest plant systems (straight radial) and the most complicated (secondary net work) that it is questionable in these times of material scarcities if as much as 40% to 50% more copper should be added to the straight radial system for the very slight improvement in service reliability that may be attained. This is true particularly in view of the fact that the great majority of plants have used the simplest type of radial system and with excellent results.

7. *Select the proper equipment. (A) Switchgear*—Factory-assembled metal-enclosed switchgear equipment requires, in general, substantially less copper than other types of installations, due to

(1) the low bus height permissible with the metal enclosure and hence short lengths of connecting copper required per breaker position,

(2) the close center-to-center spacings permissible with removable breakers which result in much shorter bus lengths, and

(3) the elimination of separate disconnecting switches with their large copper content.

It has even been proved that in piece-meal outdoor substations designed with a wood structure, the remaining amount of steel required for the outdoor breakers and other parts is slightly greater than the total steel required for the outdoor factory assembled equipment complete. Of course outdoor substations designed with steel frameworks would require considerably more steel.

Transformers—The use of auxiliary cooling equipment in the form of forced air on medium size banks and forced oil in combination with forced air or water cooling on large transformers, results in substantial material savings. A second expedient which saves material, except in the smaller distribution transformers, is the use of three-phase instead of three single-phase transformers for supplying three-phase loads. The copper savings as just mentioned for both transformers and switchgear are obtained when modern load center unit substations are applied.

Load center unit substation construction has been applied in many important installations in southern California and typical substations can be found at: Ryan Aeronautical Co., San Diego; Consolidated Aircraft Co., San Diego; U. S. Destroyer Base, San Diego; Bohn Aluminum and Brass Co., Los Angeles; Naval Air Base, Santa Ana; Western Pipe and Steel, Los Angeles; Los Angeles Shipbuilding & Dry Dock Co., Los Angeles; San Bernardino Army Air Depot, San Bernardino.

In conclusion let us again review the ways in which factory-assembled, metal-enclosed, unit substations meet present day requirements in industrial distribution systems. They:

1. Require in general substantially less copper in the switchgear sections than other types of installations, because of:

(a) The low bus height permissible with the metal enclosure and hence short lengths of connecting copper required per breaker position.

(b) The close center-to-center spacings permissible with removable breakers which result in much shorter bus lengths.

(c) The elimination of separate disconnecting switches with their large copper content.

2. Permit early ordering of substation equipment from simple one-line diagrams because standardized designs are available. Equipment dimensions are standardized, enabling detailed plant design to proceed after unit substation equipment has been ordered. This allows manufacturers adequate time to build equipment and insures arrival of unit substations often before plant construction is completed.

3. Require only minimum installation time and expense because:

(a) So-called "packaged" switchgear equipments usually are shipped in one piece for simple throat connection to the transformer at the site.

(b) Primary cable and secondary control lead termination is the only field work involved.

4. Offer adequate protection to operators and workmen by virtue of complete metal enclosure.

5. Are low-maintenance equipment.

(a) Complete metal enclosure keeps out appreciable dust and dirt, necessitating fewer clean-ups.

(b) Removable or draw-out type breakers permit quick interchangeability of units.

6. Result in lower first cost when properly considered with regard to:

(a) Substantial reduction of initial layout engineering time.

(b) Reduced installation time.

(c) Accepting manufacturers lower priced "repetitive manufacture" units, which reflect direct saving through volume production.

7. Inherently are a unit responsibility proposition, with attendant advantages resulting in having to contact only a single manufacturer.

It is estimated that during the past year and a half about 2,000 load center unit substations have been installed in war plants. These installations, on an average, were completed at a rate of 25 a week. The average number of load centers in a building is six, which brings to light another significant figure, that is, these unit substations have been installed in 333 different buildings or outdoor locations. The ratings range from 100 to 2,000 kva., the average size being 750 kva. The majority of these unit substations cover 300 to 500 kva. for 250 or 120/208-volt secondaries, and 500 to 1,000 kva. for 480-volt secondaries.

Although money is of third rate importance in the war program, it does to some extent represent man-hours and, viewed from that standpoint, deserves full consideration. The elimination of the long low-voltage feeders required for the older distribution systems and the use of small size substations rather than large ones resulted in savings of from 25 to 50% of the cost of the distribution system in the majority of the installations employing the load center principle.

WPB Design Guides

Lighting for war production suggested at high levels

Despite the situation regarding critical materials, a new *Design Guide for Interior Electric Lighting and Wiring for Wartime Construction*, just issued by the War Production Board, shows an appreciation for the necessity for high levels of illumination where it is required for war production. Issued as a supplement to the *Critical Construction Materials Design Guide* and under principles conforming to the directive for wartime construction—"mechanical and electrical features shall be reduced to bare essentials. Electrical systems shall be of simplest designs"—the individual items of the design guide are all soundly prepared.

In it fluorescent lighting is designated for use in production areas where fixtures are not mounted higher than 20 ft. above the general working plane or where it is used in addition to incandescent lighting to improve exacting visual tasks. It is also designated for use where ceiling conditions or excessive radiant heat make incandescent lighting unsatisfactory. Two other places in which it may be used are where an isolated generating plant would be overloaded by incandescent lighting or where substantial rewiring would be saved.

High intensity mercury lighting may only be used where advantageous for high mounting or where other light sources would be affected by fumes.

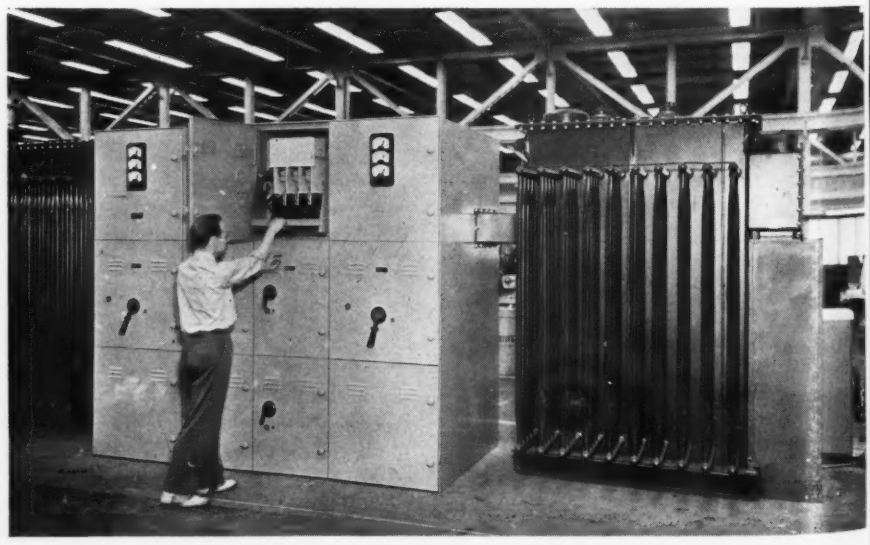
Other areas are to use incandescent or combination.

In wiring, the guide directs the use of the minimum amount of critical materials, prescribes open wiring, calls for rubber insulation only on interiors or in underground and other details in accord with the *Critical Construction Materials Design Guide.*

A supplementary table for war production lighting intensities, in maximum foot-candles in service, is reasonably high. The table is in accord with the American recommended practice of industrial lighting, 1942, issued by the Illuminating Engineering Society and approved by ASA.

Appreciative of the need for supplementary lighting at critical seeing tasks, a footnote states these often require as high as 50 to 100 foot-candles. To censerve critical materials a combination of general illumination, (20 foot-candles), with supplementary localized lighting is recommended.

Both this supplement and the *Critical Construction Materials Design Guide* should be followed in electrical layout for all new construction.



Safety-enclosed unit substation installed indoors at a load center. Unit includes Pyranol transformer and manually operated drawout air circuit breaker units

Dimmers Honored

OCD confers honor awards on 26 Coast utilities

CHECKED for dimness by an official observer from Washington, the utilities along the Pacific Coast were given a pat on the back by the Office of Civilian Defense for a good job well done. In absence of the awards usually given war industries, this newly created honor award came as a merited recognition of the effort put forth by the utilities and by their lighting personnel to make the dimout effective.

At a luncheon in San Francisco, July 7, James C. Sheppard, chairman, Ninth Regional Civilian Defense Board, made the presentation of the honor award to representatives of many of the 26 utilities to be so recognized.

James Landis, director of civilian defense from Washington, could not be present. The presentation was made by Sheppard with the following citation:

"For the exercise of their technical ability and ingenuity in solving the technical problems incidental to the reduction of the target visibility of the Pacific Coast; for their wholehearted cooperation in making available adequate personnel to insure the education of the people of the Pacific Coast in the necessity for and means of accomplishment of these measures; for the constant use of their personnel devising and achieving the necessary means to accomplish this objective, and for their sincere, instant, and united cooperation in preparing for and maintaining on this Pacific Coast an effective dimout as requested by the Western Defense Command and the Fourth Army, the United States Office of Civilian Defense is pleased to confer upon each of the members of this industry its honor award."

The presentation was made in person to James B. Black, president, Pacific Gas and Electric Co.; A. O. Olsen, manager, Bureau of Light & Power, Public Utilities Commission, City of San Francisco; H. L. Farrar, president, Coast Counties Gas & Electric Co.; A. I. Benedict, illuminating engineer, San Diego Gas & Electric Co.; Clifford Plummer, chief engineer, Modesto Irrigation District; E. L. Bettannier, electrical engineer, Pasadena Municipal Light & Power Department; L. A. McArthur, vice-president, Pacific Power & Light Co.; S. P. McFadden, executive vice-president, Puget Sound Power & Light Co.; Walter Kanzler, assistant chief engineer, Bonneville Power Administration; David Glenn, industrial relations engineer of the Tacoma City Lighting Department. The citation was also made to the following list of utilities whose representatives were not present but who will receive the honor award: Alameda Bureau of Electricity, Alameda, Calif.; Bureau of Power & Light, Los Angeles; California Public Service Co., Fort Bragg, Calif.; Public Utilities Corporation, Crescent City, Calif.; Riverside Municipal Electric Light Department, Calif.; Southern California Edison Co., Los Angeles; Turlock Irrigation District, Turlock, Calif.; California Oregon Power Co., Medford, Ore.; Eastern Oregon Light & Power Co., Baker, Ore.; McMinnville City Light Department, McMinnville, Ore.; Mountain States Power Co., Albany, Ore.; Portland General Electric Co., Portland, Ore.; West Coast Power Co., Portland, Ore.; Gray's Harbor Public Utility District 1, Aberdeen, Wash.; Seattle City Light Department and Wahkiakum Public Utility District, Cathlamet, Wash. Each recipient had delegated men from its lighting staff to assist OCD in making the proclamations effective.

James C. Shepperd, OCD regional chairman presents one of the awards to James B. Black, president of PG and E. Similar certificates were presented to representatives of other utilities present

The luncheon was presided over by Ernest Ingold, president of the San Francisco Chamber of Commerce, which sponsored the meeting. State Senator John Shelly introduced Sheppard.

● NEWBERY - CHANDLER - LORD is the electrical contracting syndicate doing the electrical installation job for Dupont Co. at Pasco, Wash. This is a syndicate of the Newberry Electric Corp., of Los Angeles, Ed Chandler, electrical contractor formerly of Los Angeles, and the Lord Co., of New York City. Ed Chandler is supervising the job in the field.

● FRITZ ZIEBARTH, spectacular electrical contractor of Long Beach, who has done considerable high line construction, has taken over the operation of the Morrow Aircraft Corp. at Rialto, Calif. This company pioneered in the development of the plastic plane of molded plywood. Besides making trainer planes of plastic, the company is now supplying molded plywood seats, expendable gasoline tanks, rudders and various plane assemblies to other aircraft manufacturers. Ziebarth applied stepped-up production methods derived from his construction experience and has increased the production facilities. E. M. Findlay, one of the members of his organization, is now in charge of the Morrow factory.

Publications

Power Factor—And How To Correct It in Your Plant is a mimeographed publication distributed to the Electrical Maintenance Engineers Assn. by Cornell-Dubilier Electric Corp. Written by W. C. King and Z. H. LaPrade, representatives of that company in Los Angeles, it is about as compact, practical and complete a treatment of power factor and correction for it as could be desired by the practical electrical man. Containing some 59 mimeographed pages, it is full of diagrams which make the understanding of the principles easy, graphs which are useful in computing and understanding power factor and tables out of which to prescribe capacitor remedies. With the restrictions on copper, the importance of improving power factor in order to make fuller use of existing circuit wiring is clearly shown.

●

The Leo J. Meyberg Co., will begin a monthly publication to its customers and prospects called *Meyberg Spectrum Service.* It is to contain short, descriptive illustrated articles on new equipment, products, parts and literature in the electronic and the electrical supply fields. It is designed to go to electrical purchasers, engineers and maintenance men. This promotional program is coincident with an advertising one in the trade journals of the West and is being handled by the A. E. Nelson Co., of San Francisco.

●

Control Diagrams is a new publication of the American Standards Assn. which describe the new American Standard Graphical Symbols for Power, Control and Measurement (Z32.3-1943) completed after years of research and work. Copies are available from the association at 29 West 39th St., New York.

Dehydrator Uses Radiant Heat Principle

Farmer's use of iron wire brooder as dryer furnishes idea; details worked out in Puget Sound Power & Light Co.'s farm laboratory

WHEN a farmer used his iron wire brooder as a fruit dehydrator, and mentioned it at a school held on the subject of dehydration, it gave C. W. Wildebour, of Puget Sound Power & Light Co.'s farm laboratory, an idea to try it out and develop the principle.

As a result of experiments and tests a simple dehydrator using the radiant heat principle entirely, without a fan, and with iron wire for the heating elements instead of lamps, has been developed. As the illustrations show, the iron wire is stretched into one continuout element on a wooden frame so arranged as to have the wire between each tray of fruit or vegetables being dried.

A total of 203 ft. of No. 20 iron wire was used. Tests showed that the arrangement of the wire required less wire on the top rows and more on the bottom to keep from building up heat concentration. Tests were run with pieces of wet cloth and later with apples until not one-half ounce difference in moisture content was found between the various layers.

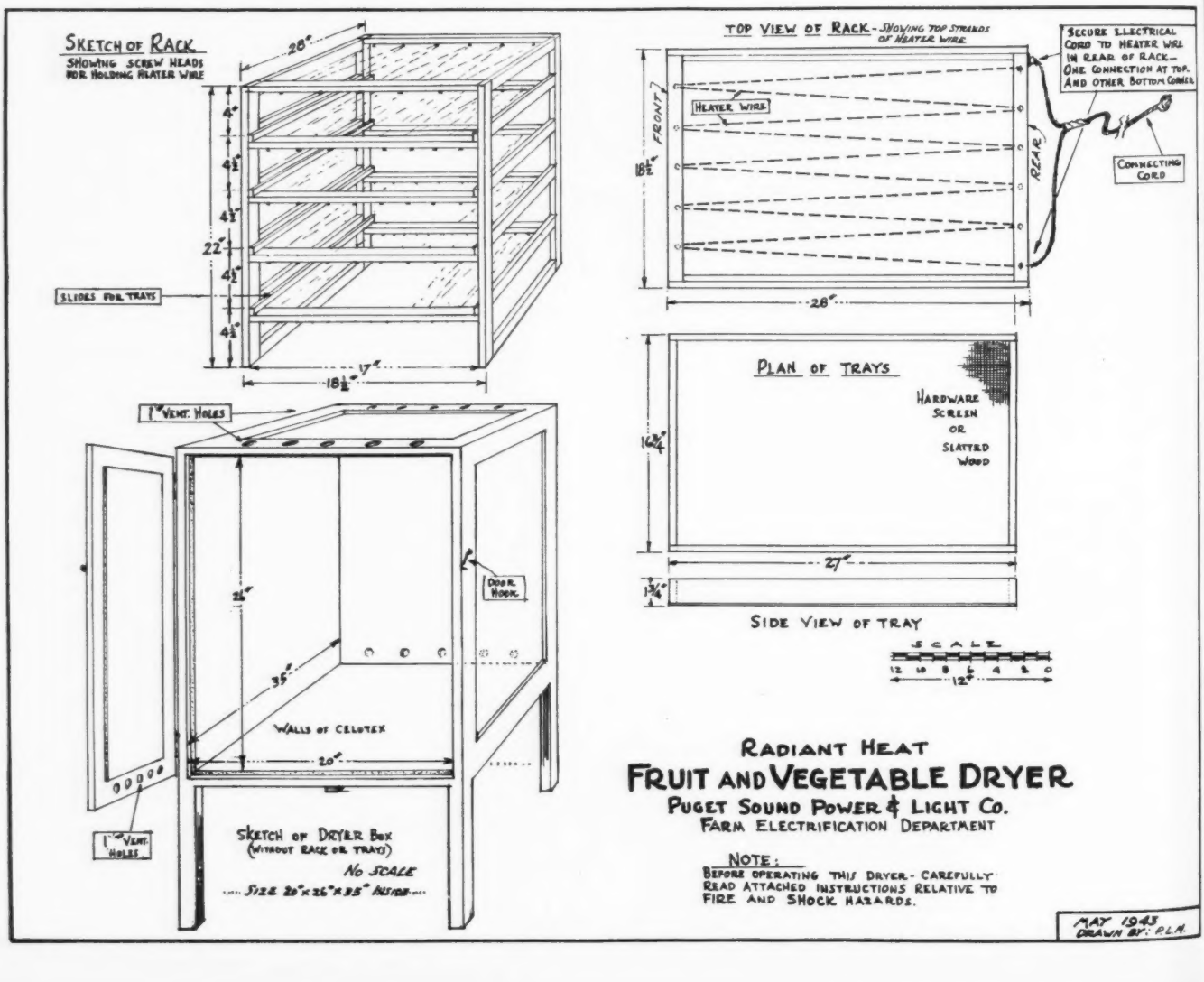
The wire is strung on wood screws on a wooden core which fits into the cabinet. Although the construction is "not an Underwriters' job" and does contain hazards, if these are recognized and guarded against and the equipment operated in a dry place, it was felt that it would serve for the duration. The length of wire used results in so low a temperature that the wood is not even charred and the equipment needs no thermostat. Thermostats are difficult to obtain.

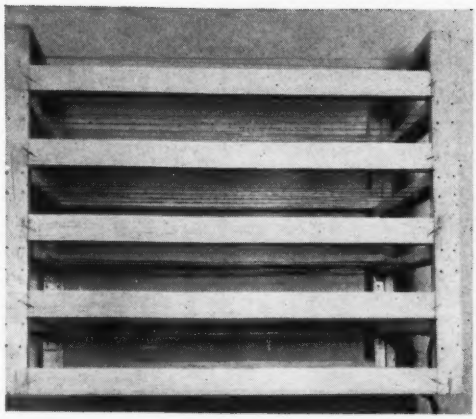
Following are construction details and operating instructions contained in a bulletin released by Puget Sound Power & Light Co.:

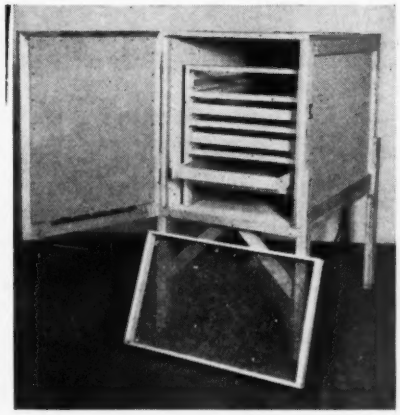
Rack

"The rack which holds the heating elements (wire) and the trays, should be constructed of ¾ in. stock. Widths are not critical except that the cross piece holding the screws on which the wire is strung should be about 1⅝ in. wide. The wire-holding screws should be placed in rows about ½ in. from the inside edge of the front and back cross pieces. Use ½ x 4-in. round-head wood screws, allowing them to project about 3/16 in.

"For the first (bottom) element, evenly space 14 screws on the front piece and 15 screws on the back piece.







Photographs show completed unit. At left is the rack, which holds the heating wire and the trays; at right is the dryer box, made of Celotex or plywood

Second, third and fourth elements, 8 screws front, 9 screws back. Fifth element, 5 screws front, 6 screws back.

"Next procedure is to form the heating elements by threading the wire back and forth on the screws. Wind 200 feet or more of No. 20 iron wire on a spool for convenience in handling. Turn the rack upside down. Begin at the back extreme left or right-hand side and wind as shown in the sketch. When the first element is complete, bring the wire *back* of the back cross piece to the element. Follow this procedure until all five elements are completed. *Do not cut the wire between elements.* Place the wire as near as possible to the screw heads. The wire should be stretched moderately tight. The two extreme ends of the wire element are connected to a cord plugged into the 120-volt outlet. Wire to cord connections should be made with bolts tightly clamped. When used as specified, the wire element will not become hot enough to ignite wood. It is well, however, to avoid direct contact of wire and wood at *all points* as a precaution.

Dryer Box

"Three-quarter-inch thick lumber of any convenient width is suitable for the frame work of the box. Celotex is preferable for top, bottom and walls but plywood or tongue-and-groove lumber may be substituted if desired. Dimensions and size and number of vent holes, as specified, should be strictly adhered to.

Trays

"Tray bottoms may be of hardware screen or slatted wood. Slatted wood is probably preferable since the trays may then be used for holding the fruit while sulphuring. Sulphur attacks iron and causes corrosion. Wood slats may be 3/4 in. wide, 1/4 in. thick and spaced 1/4 in. apart, nailed lengthwise of the trays.

Operation

"Cover the two top rows of vent holes until the dryer has reached the proper temperature, then insert loaded trays and open the vents. The matter of preparation of fruit and vegetables for drying, length of drying time, etc., are thoroughly covered by many bulletins on the subject. . . . *Drying Fruits and Vegetables*, Washington State College Bulletin No. 188 (Rev.) 1943, *Drying Fruits and Vegetables*, USDA Farmers Bulletin No. 984 may be secured free-of-charge from your County Agricultural Agent.

Shock and Fire Hazard

"Under present war conditions, it would be impractical to design a dryer absolutely shock and fire proof. Materials are simply not available. In the operation of this dryer, the following precautions should be taken:

1. To avoid shock: (a) Do not touch wires while current is on. (b) Never operate the dryer except when standing on an absolutely dry wood floor or on a rubber mat. Standing on concrete floors while operating electric devices is always dangerous, even though such a floor appears to be dry.
2. To avoid fire: (a) Use only the size and length of wire specified. See that wire is not nicked or its cross section reduced in any manner. (b) Excessive heat will develop at any point where the wire diameter is decreased. Replace wire if it becomes badly rusted. (c) Avoid direct contact of wire to the wood. Be sure wires do not become crossed and in contact."

Victory Gardens

Victory gardens were stimulated among employees of Puget Sound Power & Light Co. by the company's farm utilization section. A number of practical, simple and timely bulletins were issued to all employees during the year. The first advised as to location of a garden, preparation of soil and told what early seeds should be planted. The second told about working the soil, fertilizing it, what cutworm and slug bait should be used and gave the life of various garden seeds.

The third bulletin gave a plantage table and presented a suggested plan for a 25x25-ft. garden plot.

Fourth bulletin was a table giving kind of seeds, time to plant outdoors, distances for plants, planting depths and when these products would be ready to use.

The information was such that it supplemented other published information from the universities and the government rather than attempting to duplicate. A widespread response to the Victory garden idea followed among employees of the company.

Bulletins

A manual assembling recent research on design and operation of home dehydration equipment is available from Edison Electric Institute for $1. The report contains 37 typewritten sheets 8½x11 and is paper covered.

Eighteen pages of diagrams and photographs show construction details of dehydrators developed by power companies and college and university agricultural experiment stations. A list of recent bulletins on home dehydration and homemade dehydrators contains 13 references.

Test data, and discussion of types of equipment, development of methods and the place of home dehydration after the war is contained in the introduction.

An appendix gives the EEI home service committee report on electric range oven dehydration. Test data, methods, effect on food value, instructions for dehydration, cooking and serving are included in this report.

●

Maintenance of Farm Electric Wiring is the subject of a four-page bulletin prepared by J. R. Tavernetti, associate agricultural engineer for the University of California agricultural experiment station. Designed to help the average farmer make minor repairs to his wiring system, instructions are simple and stress safety. Essential electrical terms are defined.

Instructions for care of inside and outside wiring are given in brief, tabulated form, supplemented by illustrations. Care of portable cords and eight "dont's" to assure safety to person and equipment conclude the treatise.

ELECTRICAL WEST

McGRAW-HILL COMPANY OF CALIFORNIA
68 POST ST. SAN FRANCISCO . 4

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Dream Stuff

WHEN is a dream an incentive and when is it just a waste of time or even worse, a delusion? That is one for the Freudians, perhaps. Certainly without the dreams of better ways which have inspired inventors and enterprisers, there would have been little mechanical or physical progress. Are the social and economic dreams of the professors, the New Dealers and others who indulge in varying degrees of social planning less necessary than those of Jules Verne in the physical world of science and mechanics?

Granted that dreams are necessary to inspire progress, is it not the materials out of which they can be realized that really determine their potential realization? Dreams of tomorrow's new appliances and electrical equipment for factory, farm and commerce have much more chance of realization because they are rooted to physical realities whose properties are known or are being explored —plastics, light metals, electronic phenomena. Trouble with social and economic dreaming is that it is rooted in wishes, not realities about human behavior.

If the postwar planners for government and society will root their dreams of a better world into the earthy realism of human conduct and recognize such forces as initiative and reward, and such weaknesses as flesh is heir to, they may yet find the capitalistic system the best implement for the molding of their dreams into reality.

Congress Defied

WHEN Secretary of the Interior Ickes ordered the Reclamation Bureau to proceed with construction of a transmission line from Shasta Dam to Oroville, he openly defied the will of Congress. At the same time he set one more flagrant example of executive usurpation of the authority vested in the legislative branch of constitutional government. And he waited until Congress had adjourned. Otherwise he might have caught the full blast of Congressional wrath over an administration practice that has done more than anything else to widen the breach between the executive and legislative branches.

Succinctly here are the facts: The House passed the Interior Department appropriation bill with a $400,000 fund for construction of a 25-mile line from Shasta Dam to Shasta substation on the system of the Pacific Gas and Electric Company. The bill held that no funds appropriated by its provisions and "no funds heretofore provided" should be used to extend the line from Shasta substation to Oroville. The Senate bill ignored these provisions and included $1,900,000 for the construction of a Shasta Dam-Oroville line. The differences could not be settled in conference and the House committee was instructed to stand firm for its original appropriation and definition. Two attempts were made to secure funds by other means without success. Then a final Senate-House agreement was reached in which the Central Valley Project was allowed $22,569,000 with expenditures itemized, including a $400,000 figure for a transmission line to Shasta substation.

In this form the bill passed both houses with the House committee accepting the reduced amount of $400,000 as a declaration that only a 25-mile line from Shasta Dam to Shasta substation should be built. Subsequently the House Subcommittee which had originally considered the bill met and directed its clerk to write to Acting Reclamation Commissioner Bashore reviewing the legislative history of the appropriation.

And still Secretary Ickes ordered the entire line to be built, using unexpended funds from an appropriation made three years ago for transmission lines and terminal facilities.

This defiance of authority is in the face of previous contract negotiations with the Pacific Gas and Electric Company in which delivery and metering of power was to be made at Shasta substation. With only 150,000 kw. involved, the line becomes little more than a transmission tie in the PG and E

network. Yet Secretary Ickes insists, contrary to the will of Congress, the government build it.

The reasons for this zeal and this defiance are deeper than any surface indications thus far revealed. Nor can it be expected that Secretary Ickes will tell them—at least now. In September when Congress reconvenes he may be asked to disclose them. The House will want some good answers.

Selling in Reverse

PITY the plight of the salesman. Not only does he have no goods to sell but he goes about his work under a false label. He's an "application engineer" or a "service manager." And he is the butt of innumerable jokes. In some businesses he is sought after by customers and contrarily, is wined and dined in the hope that he might thus be induced to accept an order. All this reaches the pinnacle of foolery in a so-called salesman's card directed "To My Customers":

"Due to my independent position as a salesman, I have decided to do business and accept orders only at a time best suited to my convenience. At the present moment I am graciously pleased to permit you to call me up and try to place orders on Tuesdays, Wednesdays and Thursdays only; and between the hours of 2:30 and 4:00 p.m. This will allow me to start my weekends earlier and extend them later without interruption, also allow me to devote my mornings to rest and recreation. NOTE: The above conditions apply only so long as war conditions produce a scarcity. After the war I will be around camping on your doorstep as usual."

This is only topped by the case of the household furnishing goods dealer here on the Coast who pays a weekly bonus to the salesman who sells the *least* merchandise.

But times will change. There's a day coming when salesmen must be *salesmen* once again.

Residential Fluorescent

ADAPTATION of fluorescent lighting to the home is as certain as is victory in the war. In the opinion of lighting men—in which we concur—nothing can stop it. Glamor, efficiency, economics, quality, satisfaction of those who have worked under it in industrial plants—all these are advantages which the public recognizes. So the public will want and will buy it. This spells a profitable market to the lighting industry. One may rest assured that there are many organizations ranging from the largest industrial organizations to little local metal working plants who view the fluorescent field as a postwar bonanza.

On the other side of the picture is the possible effect this will have on the power companies. Here the picture is not so bright. Uncorrected fluorescent lighting has a power factor as low as 40%. As though this were not sufficiently bad, there is the prospective that the great efficiency of the fluorescent light source may reduce energy consumption and revenues. However, neither of these disadvantages can stand in the way of public desire and both can be overcome.

Planning today on the part of the whole industry —with the power companies taking the leadership—can shape the development of residential fluorescent lighting in an orderly manner. The best interests of the public and the industry can be served at one and the same time. Without such planning there can be chaos. A coordinated plan will assure that only power-factor-corrected equipment is sold; it will insure intensified promotion which will build load to a point offsetting the difference between incandescent and fluorescent energy consumption. But the planning will have to be done now.

INDIVIDUALS as individuals and nations as nations cannot for long sidestep their responsibilities without disastrous results. Much of the tragedy of this present war was brought about by a refusal on the part of nations to face boldly the fact that a crisis which would mean the giving up of the comfortable, complacent method of living if it were to be tackled, was approaching or imminent. The temptation to continue the easy way of living until the proper time for action had passed was too big to be resisted; the result was the tragedy we now see around us on every hand. The complacent attitude had only one effect—it magnified the task which eventually had to be done and multiplied many times the effort and sacrifice necessary for its complete fulfillment. This principle has a parallel in the life of every one of us. We all have a share in the nation's responsibility for the war. Some see this more clearly than others; some accept this responsibility with all that it means in effort and sacrifice; there are others who fall back on escapism, with the idea that somebody else is going to do the job. . . . Anyone who sees a responsibility and clearly dodges it, morally deteriorates to that extent, and eventually has to pay the price. . . . On the other hand, a man who faces a duty when he sees it and pays the price at that time, builds something in his character which fortifies him for future happenings. The effort pays big dividends.—W. G. Murrin, president, B. C. Electric Railway Company.

Safety Factors, Welding, on Agenda

Northwest Inspectors' annual meeting topics all related to wartime wiring developments and code

WELDING, both a-c and d-c, buses and bus structures, power feeder systems, emergency alternate specifications for wire and cable, cold cathode linear lighting, wartime sales control and an address by the editor of *Electrical World*, S. B. Williams, on *Factors of Safety* will touch intimately upon some of the wartime problems of electrical inspectors at the annual meeting of the Northwestern Section, International Association of Electrical Inspectors, New Washington Hotel, Seattle, Aug. 26 and 27. W. R. Volheye, electrical inspector for the state of Oregon and chairman of the Section, will preside and T. W. Bowry of Richmond, Va., IAEI president, and Victor H. Tousley, secretary-treasurer, IAEI, Chicago, will address the meeting.

Program Details

Editor Williams will address the afternoon session of the first day. His talk will deal with a questioning of the factors of safety applied to interior wiring systems in the light of wartime developments and the emergency installation rules.

Leon F. Moore, general sales manager, Electrical Products Consolidated, will talk on the war advances of cold cathode linear lighting, that evening. *New Highlights and Blackouts* will be presented by Walter E. Potter, division engineer, lamp department, General Electric Co.

So successfully developed at the Montana Chapter meeting, an open forum, discussing the April 1, 1943, edition of the supplement to the 1940 National Electrical Code, will be conducted under the chairmanship of L. W. Going, chief electrical inspector, Portland. On the advisory panel answering the questions put to it about the code will be J. L. Christensen, S. B. Clark, W. L. Gaffney, Harry Hilpert, C. M. Kirsop, E. E. Lee, H. A. Morton, F. H. Murphy, A. J. Newton, V. B. Wilfley and E. J. Wolters.

Friday's session will open, after a code breakfast directed by C. M. Kirsop, of Olympia, with a discussion of wartime activities of Underwriters' Laboratories by H. G. Ufer, Western superintendent, Los Angeles. Civilian Defense will be the subject of Capt. Stephen E. Sanislo, of Seattle Fire Department, who also heads the fire and accident prevention and public relations committees.

Harold M. Hudson, resident application engineer, I-T-E Circuit Breaker Co., will discuss *Electrical Buses and Bus Structures*. This will be followed by T. M. Widrig, field engineer, Trumbull Electric Mfg. Co., on *Power Feeder Systems*.

Wire emergency specifications will be discussed by Harold H. Weber, assistant manager, wire sales, U. S. Rubber Products, Inc., New York City. This will be followed by a discussion of welding. A-c welding will be discussed by V. B. Wilfley, engineering & service department, Westinghouse Electric & Mfg. Co., Seattle, and d-c welding by J. R. Morrill, assistant to the vice-president, Lincoln Electric Co. Wartime sales control will be talked of by I. B. Sturges, deputy electrical inspector, Portland, and elevator inspection in Oregon by Volheye.

The opening morning will present the presidential reports, reports of the chapters and of Secretary-Treasurer Fred T. Weber. The code and article committees of the section will report on Friday afternoon.

Because of the shortness of the program under wartime conditions, entertainment will be minimized and held on Saturday following the meetings. The Electric Club of Washington will be host for this. R. A. Walker, Puget Sound Power & Light Co., is chairman of the local annual meeting committee.

W. R. Volheye, Northwest president

● WILLIAM GAUNT, business manager and financial secretary of Local 46, International Brotherhood of Electrical Workers, Seattle, has started a house organ for the local, the first issue coming out about the first of July. It is simply titled *Local 46* and is to appear monthly.

O. D. Butterfield, president, Southwest Section, Electrical Inspectors

Southwest Adds

New subjects added to annual inspector meeting program

An addition to the program of the Southwest Section, International Association of Electrical Inspectors annual meeting, at Clark Hotel, Los Angeles, Aug. 30, 31, Sept. 1, has been announced by Harold L. Gerber, program chairman. W. R. L'Hommedieu, Westinghouse Electric & Mfg. Co., San Francisco, will present a paper, *"Uprating Industrial Plant Distribution Systems.* A pertinent topic in view of critical materials restrictions, the paper will deal with the effect of loading distribution systems to their full rated capacities.

The effect of the many interim amendments to the National Electrical Code will be discussed from a practical, realistic point of view by C. U. Wenn, San Francisco engineer. Discussion of these amendments is expected to be one of the chief reasons for holding the meeting, since it is around them that electrical inspectors must base present-day wiring practices.

Full account of the other program details was carried in the July issue.

● THOMAS INGLEDEW was re-elected president of the Institute of Electrical Engineers, Vancouver Section, at the organization's thirty-second annual meeting in Hotel Georgia. Ingledew is chief engineer of the B. C. Electric Railway Co. Other officers for 1943 are Douglas Robertson, vice-president; L. L. B. Stacey, secretary, and Thomas Hadwin and G. K. Haspell, executive committee.

Northwest Meeting

NWEL&PA Places Emphasis on Postwar planning

EMPHASIS on postwar planning for its next year's program was advocated at the thirty-sixth annual meeting of the Northwest Electric Light & Power Assn. in Portland, July 14. The idea was first expressed in the report of George T. Bragg, president, and amplified in other reports and discussions throughout the meeting. Ways and means of effectively organizing electrical industry cooperation with other business and industrial groups for maintaining a high level of employment and business activity after the war will be left to the newly elected officers and incoming executive committee.

J. A. Hale, vice-president, Utah Power & Light Co., Salt Lake City, was elected president for the coming year, with Z. E. Merrill, president, Mountain States Power Co., Albany, Ore., as vice-president.

Vice-presidents elected for each state were: Idaho, Ralph E. Gale, Idaho Power Co.; Montana, M. E. Buck, Montana Power Co.; Oregon, James H. Polhemus, Portland General Electric Co.; Utah, W. A. Huckins, Utah Power & Light Co.; Washington, C. Patrick Johnson, Puget Sound Power & Light Co.; and for the province of British Columbia, E. H. Adams, B. C. Electric Railway Co.

Members-at-large of the executive committee: Lewis A. Lewis, Washington Water Power Co., Spokane; L. R. Wilson, lamp department, General Electric Co., Portland; and Harry Dunlap, Westinghouse Electric Supply Co., Spokane. T. E. Roach, Northwestern Electric Co., Portland, and George T. Bragg carry hold-over terms on the committee.

The resolution embodying the idea of postwar planning also reiterated last year's pledge of the association to unremitting support of every phase of the nation's war effort and to continued cooperation with municipal and federal power systems in the successful operation of the Pacific Northwest power pool.

Two new honorary life memberships were voted, the first since 1938, to-wit: Lewis A. McArthur, vice-president, Pacific Power & Light Co., Portland, and Dean R. H. Dearborn of the school of engineering, Oregon State College, Corvallis. Formal citations of these members called attention to their long records of interest in association affairs and their accomplishments in the field of public utility and scientific development.

● JESS P. PASCHALL of the engineering department, Portland General Electric Co., Portland, was elected president of the Pacific Northwest Dispatchers Assn. for another year at the organization's annual meeting in July. The association brings together superintendents and dispatchers of power, transportation and other public service industries and city and state police. It was organized in May 1941, and is believed to be the first in the Nation.

Geary Visits

Paul M. Geary, assistant general manager and field supervisor, National Electrical Contractors Assn., paid a visit to the Pacific Coast late in June to confer with NECA chapters. A special meeting was held in his honor by the San Francisco Bay Chapter at the San Francisco Electrical Contractors Assn. headquarters, 1434 Howard St., San Francisco, June 23.

After conferences in the Bay region, Geary and William J. Varley, Western field representative, NECA, went to Los Angeles where a similar meeting was held with the Los Angeles Chapter. Emphasis was placed upon the slowing down of new construction and the necessity for contractors to put themselves in position to do the maintenance work on war plants.

IES Sections Elect

New officers for the two Illuminating Engineering Society sections in the San Francisco Bay Region and Los Angeles were announced by the IES following the tabulation of ballots. The following officers will take office Oct. 1: San Francisco Bay Cities Section—Romaine W. Myers, consulting engineer, chairman; Robert L. Dearborn, Kaiser Co., vice-chairman; H. H. Robison, Pacific Gas and Electric Co., Oakland, secretary; W. P. Bear, PG and E; Walter Carlson, General Electric Co. lamp department; Guy De Leuze, Panama Lamp Co.; and Robert G. Dummel, Holophane Co. board of managers. Southern California Section—T. H. Shepherd, Bureau of Power & Light, chairman; L. W. Luley, Westinghouse Electric & Mfg. Co., secretary; Urban L. Beh, General Electric Supply Corp.; H. T. Crane, Southern California Edison Co.; C. G. Dahlgren, City of Riverside; A. W. Nye, University of Southern California and Gil Southern, Wakefield Brass Co., board of managers.

Puget Sound Chapter IAEI discussed material substitutions at its meeting last month. V. B. Wilfley was speaker.

Milne On Committee

J. Scott Milne, regional international vice-president, International Brotherhood of Electrical Workers, San Francisco, is on the labor-management planning committee of the electrical construction industry. This committee was presented at the recent members' conference of the National Electrical Contractors Assn. at Chicago June 6, at which Milne and Charles A. Langlais, electrical contractor, San Francisco, were Western delegates. William J. Varley, Western representative of NECA, also attended.

M. H. Hedges, research director of IBEW, and Paul Geary, assistant general manager, NECA, are co-chairmen of the committee. Purposes are to stabilize the construction industry after the war, to advance the free enterprise system, to give full employment and high wages and to insure fair profits for NECA contractors. Trend noted in the conference was the recognition of a shift from new construction to the possibilities of maintenance work. Significant were talks by Joseph D. Keenan, associate director, labor production division, WPB, Washington, and M. J. Boyle, IBEW vice-president in Chicago, both of whom advocated a lower wage scale for maintenance in comparison to new construction in order to permit electrical contractors to handle plant maintenance on a reasonable basis.

In lieu of the customary educational program, Electrical Maintenance Engineers Assn. of Southern California heard about *Japanese Psychology and the War* as discussed by Carl Etter, a former instructor at Imperial University, Hokkaido, Japan. Etter at present is director of the rehabilitation program for physically handicapped students in Los Angeles schools. In his talk he said that it is customary for funeral rites to be held for members of Japan's military forces before leaving for combat zones. This, he said, would be sufficient reason for their well known fanaticism.

Three motion pictures supplied by the defense council were shown by members of the Bureau of Water & Power. The next meeting will be held on the third Wednesday in September, at which time three new members of the executive committee are to be announced.—Henry Bush, editorial chairman.

Electrical and mechanical equipment of the Alameda County Court House, Oakland, were described and shown the Electrical Maintenance Engineers Assn. of Northern California at its July 22 meeting. James Gayner, mechanical engineer who had designed the system, described it. Jack Clifford, chief engineer for Alameda County maintenance, took the group on a tour of the building's air conditioning and mechanical systems. Gayner, in speaking, urged better coordination between designing engineers and maintenance engineers. Arthur Cazin, president, had charge of the meeting.

Salvaging Waste Light, was the subject at a recent meeting of the Bay Cities Section IES. Roy Emery, DuPont Co., was the speaker.

On the Beam

A "RIGHTO" British proposed "electrical solution" of the competitive positions of gas and electricity has been advanced by the Incorporated Municipal Electrical Assn., according to *Electrical Review* (London). The plan suggests that all gas be sold to the electric supply industry for use in gas turbines or under gas-fired boilers for the generation of electricity. Electric energy would be used for all purposes, replacing gas. The gas industry would retain the benefits of by-products derived from the manufacture of gas. "Now they're cooking with gas."

★

Look for a public airing of the Northwest power situation unless the Bonneville Power Administration ceases its attempt to "take over" the highly successful Northwest Power Pool

★

Speaking of power pools, the Pacific Southwest set-up involving private and municipal systems in Southern California and Arizona, has been classed by top Washington authorities as "the best operated in the whole U. S."

★

The ways of the bureaucrats with the taxpayers' money are weird. The Washington PUD Commissioners' Assn. at a recent convention passed a resolution recommending that one-quarter mill of the 2-mill tax levy in all Peoples Utility Districts in the state be set aside for publicity expenses. Avowed purpose is to stimulate interest in the PUD movement. In the background is the November '44 election when voters will pass on No. 25, the new designation for Initiative 12 which the legislature tried to slip over and which 125,000 citizens protested.

★

Dimout regulations have done more than increase street and highway accident rates. The public is definitely light conscious. All of which spells opportunity for the lighting boys once the war is won.

★

This "free enterprise" system keeps the hazard always before a business that unless it is on its toes someone else can start up in business and take it away from him. There is more than a mere rumor to the hazard facing old line manufacturers of appliances that when the shooting stops a whole flock of wartime airplane, shipyard and other war producers will try their hand at making new and glamorous household appliances. It would be very smart of the old timers to be quite sure they do what the politicians call "mending their fences." Neglected dealers may easily be led to new pastures for their supply.

★

Television is now definitely on the promise list for after the war. A high official in one of the leading manufacturers of radio equipment committed himself and hence his industry. As long as retooling is necessary to begin production for civilians, it might as well be for television. Enough has been learned from radar to iron the bugs out of transmission, it seems, which was one of the drawbacks before.

★

Office building ownership and management tells us that there will be practically no new construction in this field after the war. Too much space to be released by government agencies. Competition between buildings for tenants will be keen. Considerable modernization work can be expected, though, on lighting, elevators, air-conditioning, and elimination of d-c with ignitrons.

★

Workpiles of possibilities for civilian rehabilitation after the war are being developed by increasing numbers of communities. Initiated by business-successful Ernest Ingold, president of the San Francisco Chamber of Commerce, the idea is spreading. The first electrical workpile is that of sign and street lighting. Next will come building remodeling. Wiring back to normal code conditions to eliminate wartime expediency wiring should make another sizeable workpile. But the Ingold idea is to organize it and get tentative commitments so that the employment level can be kept abreast of the job needs of returning soldiery.

★

Postwar planning as a term is much overworked. In fact, it's almost a phobia. And many people oppose any mention of it until the war is won. One suggested substitute name for postwar planning is "research and development."

★

Interior distribution voltages for commercial and industrial lighting service as high as 440 volts appear to be certain developments. Fluorescent lighting accounts for it. What will happen in homes is something for the research people to figure out. Here in the West with large cooking and water heating saturations, 220-volt residential service is common. Maybe fluorescent will be adapted for this voltage.

★

Current $64 question: Wonder what the union boys are going to do with all of the dime-a-dozen electricians—male and female—created by the war?

★

Possible development affecting rural customers and rural load is a proposed restriction on the sale of butane or "bottled gas" for farm use. Full output is needed to fortify high octane gasoline and for producing synthetic rubber. Just where the cooking equipment would come from to substitute for the butane ranges is the thing holding back an official order. Maybe the WPB might release some electric ranges, or even roasters.

★

Honolulu has lost its distinction as the only completely blacked out major American city. In July restrictions were modified to permit interior lighting, properly shaded, until 10 p.m., provided windows are not visible from the sea.

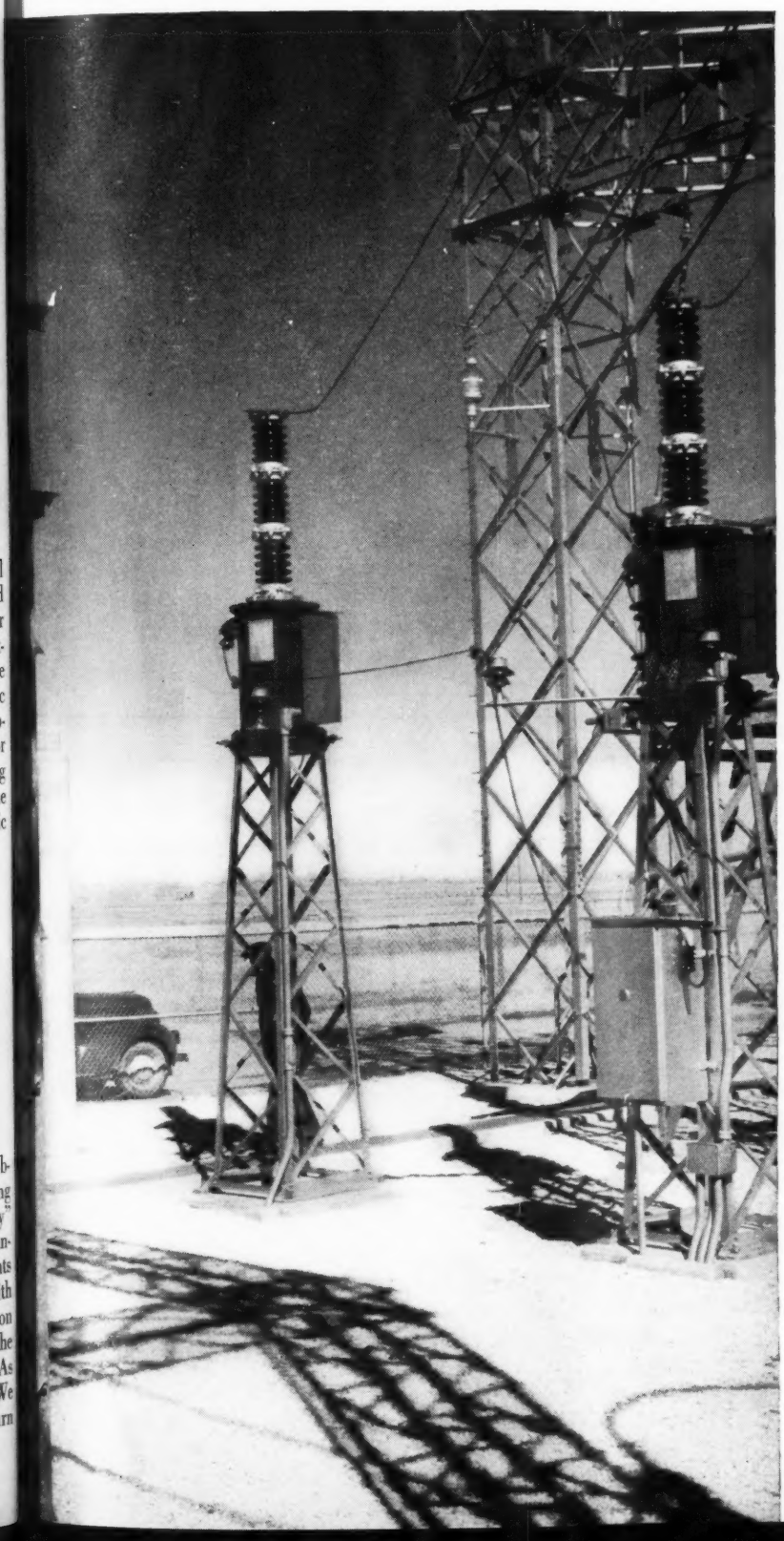
★

Absence of light in Coast cities probably explains why the PCEA Planning Committee's "Light up for Victory" program is clicking. (In San Francisco it is set as the "When the Lights Come On Again" celebration.) With a little more interest and organization work on the part of the industry, the program can be made nation-wide. As one street lighting engineer says, "We put 'em out and we know how to turn 'em on."

PRESENT power systems

PLUS G-E carrier current

SAFELY deliver more kilowatt hours



MANY power companies—faced with increased power demands for war uses — can deliver more kilowatt hours and stay well within safe operating limits by installing modern G-E carrier-current equipment. Regardless of the type of carrier function needed, General Electric can supply it.

Besides offering all types of carrier-current equipment, an exclusive feature of G-E design is its package-type unit construction. For example, your immediate need may be pilot relaying to improve stability of transmission lines, increase their load-carrying capacity, and reduce outages in protected or unprotected sections. Later, when more functions are wanted, additional G-E apparatus is designed to fit quickly and easily into your original installation.

Literally "packaged" G-E carrier-current equipment can be added as needed for every purpose, if you insist on modern G-E equipment from the start.

Here are some major carrier-current functions that may boost the kilowatt-hour output of your system:

1. Pilot relaying
2. Transferred tripping
3. Automatic tie-line load control
4. Telemetering
5. Telephony
6. Supervisory control
7. Line sectionalizing control

G.E. has led the field in carrier-current design, research and application for 20 years, and its installations cover the nation. Your G-E representative will gladly discuss with you the application of carrier current to your system. . . . *Electronics Department, General Electric, Schenectady, N. Y.*

Tune in "THE WORLD TODAY" and hear the news direct from the men who see it happen, every evening except Sunday at 6:45 E.W.T. over CBS. . . . On Sunday listen to "The Hour of Charm" at 10 P. M. E.W.T. over NBC.

Transmitter-receiver assembly mounted on same column that supports the coupling capacitor: base also includes line tuning equipment and a potential device.

GENERAL ELECTRIC

151-84

This
NEWSPAPER
advertisement was published in Washington, New York and Chicago by McGraw-Hill, to make friends for business.

When the Stripes are in the Attic . . .
A NEW BATTLE WILL BEGIN

Sound Democracy is Based on Public Understanding

The purpose of this advertisement—and of the messages which have preceded it in newspapers in New York, Chicago, and Washington—is to build a better understanding of the importance of Industrial Progress.

America was built on industrial progress. Victory for our armies would be impossible without our unparalleled industrial strength. Our post-war future will be shaped by it. But to maintain this industrial strength we must have the intelligent cooperation of every citizen.

In a democracy, where all have a voice, all must understand.

Fortunately, we have all the facilities with which to accomplish this educational job. American businesses, large and small, can do their share. Through their local press and other means they can educate the people in their own communities to an understanding of the inescapable fact that we cannot hope to solve our Home Front Problems—now or post-war—unless the productivity of each and every American is increased.

It is our hope that this McGraw-Hill Campaign will contribute to this understanding and provide the "educational yeast" for others, so that every industrial community can receive essential insight into the part that a sound industry can play in assuring good living.

Free newspaper mats of this and other advertisements of the Campaign are available to those businesses who lack facilities for telling their own story in their local press. Space is provided, in these mats, for the signature of the local sponsor.

James H. McGraw, Jr.
President
McGraw-Hill Publishing Company, Inc.

WE were thinking about a soldier named Tim the other day . . . but not in a sticky, sentimental sort of a way.

We were just thinking about the office boy who'll come home a trained technician.

You see, we'll owe Tim a job when he gets back. But how the heck are we going to fit a man who has kept a Flying Fortress in fighting trim back into the minuscule responsibilities of sealing letters and running errands?

Obviously, we've got to figure out a wider scope for a Tim who has learned a great deal, not only about machines, but about people.

And how about the girl who has Tim's old job? She is doing all right. Maybe she will get married and quit work when the war is over . . . but then again?

See how our thoughts were running? Two jobs to provide where only one job existed.

► If you run a business, or a department, you know the next step in our thinking by heart. Multiply Tim by the number of employees that are in the services, or in government jobs, and add the new people that now have their old jobs, and you will see that this nation faces the greatest opportunity in the history of the world.

If we live up to that opportunity, we will not have 10,000,000 unemployed, with their wonderful training going to waste. Instead we will have a country humming with the released energy of its whole people.

FREE MATS: If you would like to publish this message over your own company name, or distribute it in handy booklet form, write or wire: Research Dept., McGraw-Hill Publishing Co., Inc., 330 West 42nd St., New York (18), N.Y.

When the Stripes are in the Attic . . . A NEW BATTLE WILL BEGIN (cont'd)

What are we going to do about providing 10,000,000 new jobs when the uniforms are in the attic?

That will be the peacetime battle, and thousands of civilians are now planning its strategy and tactics.

Fortunately, there is a better way to use the energy and skill of our fighters and war workers than putting them on ambition-killing government jobs in some super W. P. A.

American Industry is the best outlet for personal energy and skill.

If you doubt that, remember that our modern industry is little more than 50 years old.

In that short time it has provided more good living for more people than all the centuries and milleniums that went before.

American Industry can give good jobs to every skilled and energetic person who wants to work.

How? By extending the process that produced so much good living for so many in the years gone by.

► If that is true, then everybody should understand how industry works, so that the growth of industry can be encouraged.

The purpose of industry is to get more work done in less time.

The life of industry is improvement.

When products are constantly improved (either in appearance, service or price) more and more people buy them. That makes jobs.

When there is no industrial improvement, you have a country with living standards like those in China, or India.

When there is slow industrial improvement, you have a country like, say, one of the Balkan states.

When there is rapid industrial improvement, you have a country like ours, with the highest living standards in the world.

We haven't always understood this, and so we have had periods when there was little new machinery and improvement in plant. That helps cause depressions.

But, remember that the plants which made electric refrigerators, radios, air conditioning and streamlined trains supplied good jobs during the last depression, because those were *improved* products which people bought in spite of hard times.

► We don't need to worry about creating 10 million new jobs, if we give our nation of Eli Whitneys a chance to do their stuff.

Why do we say "give them a chance"?

Because the only chance industry has to improve is through its Seed Money.

As you know, Seed Money is that part of profit which is "ploughed back" into a business in improved factories, machines, methods and products.

As you also know, a very great amount of Seed Money is being taxed out of existence.

We don't think it makes much sense to stunt the growth of industry at a time when 10 million new jobs will be needed, do you?

If you think Congress should look into this matter of providing better conditions for industrial growth, tell your Congressman how you feel.

"Industrial Progress
is the Source of all Good Living."

THE McGRAW-HILL NETWORK OF INDUSTRIAL COMMUNICATION

24 publications, which gather "war-news" from the "war-production-front" through a staff of more than 153 editors and 725 engineer-correspondents . . . More than 1,500,000 executives, designers, production men and distributors use the editorial and advertising pages of these magazines to exchange ideas on war-production problems.

McGRAW-HILL BOOKS

Publishers of technical, engineering and business books for colleges, schools, and for business and industrial use.

This advertisement is available in handy booklet form. (Less than 100 copies free. Larger quantities, $1.00 per 100; $10.00 per 1000.)

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Business Publishers International Corporation, an affiliate, publishers of Business and Technical Magazines for Latin America, and Overseas Circulation

NEWS of the industry

ICKES ORDERS LINE FROM SHASTA TO OROVILLE

Construction of a 220-kv. line from Shasta Dam to Oroville has been ordered by Secretary of the Interior Ickes after specific funds for such a line were removed from the Interior Department appropriation bill by Congress. The Central Valley Project allotment included only $400,000 for a line from Shasta Dam to Shasta substation on the lines of the Pacific Gas and Electric Co.

That the line was to be built without Congressional approval was revealed when Acting Reclamation Commissioner Bashore announced that the War Production Board has granted priority for 1,207,800 lb. of aluminum to be used in the fabrication of conductors. Other material had been purchased. Secretary Ickes contended that the line was needed to serve war loads and save fuel.

"The Congress in 1942 provided funds for the construction by the bureau of the transmission system of the Central Valley Project," the Secretary recalled. "The provision was made by an amendment initiated in the Senate for the purpose of serving war loads and in order that there be no abandonment of the 'fixed' Congressional policy with respect to construction of the system by the bureau, as expressed in the report of the Senate Appropriations Committee dated May 25, 1942. The Shasta-Oroville line is essential for war purposes and for the full development of the Central Valley Project. The unexpended balances of these funds are sufficient to complete this line.

"The Bureau of Reclamation has purchased all of the equipment for the line and much of it is already on the ground. It has placed an order for the aluminum conductor for the electric energy in accordance with the allotment of metal made on July 13, 1943, by the War Production Board, which in 1942 cleared the project and in February 1943 granted priorities for all critical materials. The right of way has been secured for a considerable distance and bids for the construction work are to be advertised this month.

"I am well aware of the persistent efforts of the Pacific Gas and Electric Co. to block the construction by the bureau of the transmission line so that only the PG and E would have access to the power produced by the government at the Shasta Dam power plant which is being constructed with public funds. I have read the item in the Interior Appropriation Act for 1944 appropriating $400,000 for the 'transmission line to Shasta substation'. I also understand that the Congress when it reconvenes in the fall may be called upon to pass again on the policy reiterated last year that the Bureau of Reclamation should construct the transmission system."

Under present plans, if Congress votes next fall against the principle of transmission line ownership and operation by Interior, whatever construction has been done and whatever materials have been purchased will be sold to PG and E which then will be expected to finish the line. If Congress approves the principle, Interior will complete it and sell most of the power to PG and E at the Oroville substation busbar until such time as it can extend the line south to Sacramento to feed the proposed municipal distribution system there. In case of approval next fall, it is a reasonable conclusion that there will be an item in the fiscal 1945 Interior appropriation bill for a line from Oroville to Sacramento.

Coulee Unit Only New Capacity Allowed in West

Only one Western installation is included in the 500,000 kw. of new capacity for 1945 announced by OWU Director J. A. Krug. It is Unit No. 7 for Grand Coulee, a 108,000-kw. machine to be installed in the east power house. It will be the first on that side of the dam, the last three positions in the west power houses being occupied by two 75,000-kw. machines transferred from Shasta power house.

The proposed 1945 power program is the smallest since the beginning of the war. Most of the capacity selected was taken from the 4,000,000 kw. on which work was suspended in 1942. Total capacity added since the war program began will exceed 8,000,000 kw. by the end of 1944. At that time installed capacity of Class I utilities will total 45,600,000 kw.

Krug stated that some power savings will result from the intensive nation-wide voluntary conservation program on which the government and the utilities are working at the present time. The program is aimed at saving coal, oil, natural gas, manpower, tungsten, steel, copper and other critical materials and equipment.

COLORADO REA ORDERED TO REDUCE INVENTORY

The Morgan County REA in Colorado is in process of diminishing its stockpile of critical war materials from $107,000—where it was when the War Production Board discovered its existence—to $10,000—where the WPB has ordered the inventory must be before this REA affiliate shall be entitled to any further priorities.

Percy N. Moore, regional WPB compliance officer, brought the charges, which were not contested at a hearing in Denver, characterizing the Morgan County association's practices as: "The most glaring example of hoarding of critical war materials which we have encountered in the mountain region." Moore asserted the Morgan County REA had used approximately $75,000 worth of critical materials and equipment in completing unauthorized electrical extensions and expansions of its system; and in addition had an inventory which was some eleven times the size it should have been.

George T. White, president of the Morgan County cooperative, which operates more than 500 miles of lines in Morgan and adjoining counties, blamed the situation on William Parker, former superintendent. The association, said White, depended on Parker to make purchases; and, though the board of directors questioned the superintendent's purchases, "the materials were there before we knew anything about it and there wasn't much we could do." Mr. White added that the Morgan County REA did return some materials which arrived soon after Parker's resignation.

Replacement of lines not requiring replacement, and construction of 53 miles of unauthorized extensions were specifically charged.

Fort Peck Power Plant Now in Operation

With installed capacity of more than 30,000 kw., the initial power plant at Fort Peck Dam in Montana was placed in operation last month. Major part of the power produced will be distributed by the Bureau of Reclamation to war industries in Montana and Utah, it was announced by Secretary Ickes.

Construction of the dam, largest earth-fill dam ever built, was started in the fall of 1933 and storage of water began in 1939.

This

CONSERVATION PLAN

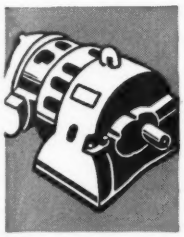
will help you

SAVE MAN-HOURS . . .

SAVE MATERIALS . . .

SPEED PRODUCTION

1. Conserve

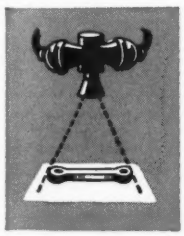


by strategic selection, application and use of electrical equipment.

EXAMPLE

Standard gearmotors or speed reducers save materials required by sheaves, belts, chains and line shafts. In addition, they commonly effect power or energy savings up to 10.5%.

2. Conserve



by utilizing new developments that reduce need for critical materials and man-hours.

EXAMPLE

X-ray inspection detects defective castings or welded sub-assemblies before they are machined or assembled. It replaces "destructive" tests . . . reduces rejects . . . eliminates wasted machinery man-hours.

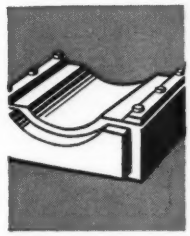
3. Conserve

by utilizing available facilities for preventing breakdowns and reducing machine outages.

EXAMPLE

"Maintenance Hints" — a complete, pocket-size manual covering recommended upkeep practice for electrical apparatus—is a maintenance help available without charge. Check your Westinghouse representative for copies.

4. Conserve



by utilizing materials which in many cases can replace critical materials and do a better job.

EXAMPLE

Micarta, a heavy-duty industrial plastic, outwears other materials in many bearing applications. Typical of many uses are steel mill roll neck bearings and marine stern tube and pintle bushings.

5. Conserve

by tapping all sources of salvageable scrap.

EXAMPLE

Systematic planning can uncover many ways of reclaiming worn equipment and waste material. Samples of salvage forms and organization charts in use in Westinghouse plants will gladly be made available on request.

Wartime Conservation means MORE than just conserving copper, steel, aluminum . . . it means the most strategic possible use of all of the ingredients of Victory—materials, man power, time and ingenuity.

These five major points comprise a complete program developed by Westinghouse for Wartime Conservation. This program packages up Westinghouse engineering experience in the entire field of electric and power equipment and related materials. Examples noted are but five of many specific recommendations.

This experience and these recommendations are offered fully and without obligation.

Ask your Westinghouse representative today for a copy of the new 100-page book, "WARTIME CONSERVATION." Or write direct to Dept. 7-N, Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

J-90481

Westinghouse

PLANTS IN 25 CITIES... OFFICES EVERYWHERE

RELIABLE CAN HELP YOU

SAVE TIME

in speeding the war program by using Reliable Straightline splices on new construction and on maintenance.

SAVE COPPER

by using these perfect joint making units over and over again.

RELIABLE

STRAIGHTLINE SPLICE

Positive

Permanent

Low in Cost

Reliable ELECTRIC COMPANY
OVER 30 YEARS SERVICE TO THE UTILITIES
3145 CARROLL AVENUE · CHICAGO ILLINOIS

COLUMBIA BASIN HEARINGS EXPECTED THIS MONTH

Hearings in the House Irrigation and Reclamation Committee investigation of plans for the development of the Columbia River basin were expected to begin late in July or early in August.

Resolution of Chairman Compton I. White, Idaho Democrat, calling for such investigation was passed by the House last month and $5,000 was voted the committee. Hearings will be held in Washington, D. C. and in Idaho and Montana, according to White.

The investigation, which has the support of Republicans and Democrats alike in the Northwestern delegation, will be aimed at blocking completely the plans of the Bonneville Advisory Board and the Corps of Engineers to raise the levels of Flathead Lake, Montana, and Lake Pend Oreille, Idaho, to provide an additional 3,000,000 acre-feet of water for the Bonneville and Grand Coulee power stations hundreds of miles downstream on the Columbia River.

Minnesota Senator Asks REA Investigation

Aimed at the National Rural Electric Cooperative Assn., a resolution to investigate the administration of the Rural Electrification Administration to determine whether political groups have been organized to influence conduct of REA has been introduced by Senator Henrik Shipstead, Minnesota Republican.

The investigation would be made by the Senate Committee on Agriculture and Forestry or any subcommittee thereof. In addition to investigating formation of political groups to influence REA the committee would:

1. Investigate the organization and financing of such groups.
2. Review what efforts such groups have made to influence REA administration.
3. Determine whether REA administration has suffered as a result of its incorporation into the Department of Agriculture.
4. Decide whether REA should be restored to its original status of an independent agency responsible only to Congress.

Preamble of the resolution points out that REA cooperatives "should be and must be encouraged to become free from political or governmental controls as rapidly as possible," that Congress "set forth its policy of protecting REA from political influences and controls" and that "evidence at hand supports the belief that groups have been organized and supported from government funds to engage in activities intended to influence the Congress and other government agencies, and which activities are declared to be in violation of the letter and spirit of the Rural Electrification Act."

Colorado REA Would Buy M. U. C. Properties

Another Colorado REA authority is seeking to extend its realm of influence through further purchase of properties from the Mountain Utilities Corp., whose headquarters office is in Colorado Springs. Recently the M.U.C. sold to Intermountain Rural Electric Assn. its Woodland Park transmission system. The transaction now before the State Public Utilities Commission for consideration is transfer of M.U.C.'s distribution and service lines supplying Kiowa, Monument, Elbert, Elizabeth and Palmer Lake areas to the same purchaser.

Under terms of the projected contract—said to involve some $150,000—Mountain Utilities Corp. will retain its hydroelectric generating plants at Aspen and Buena Vista. M.U.C. buys its electric power for the Kiowa-Monument-Elbert Elizabeth-Palmer Lake region from the Colorado Springs municipal power plant, which, presumably, will be the energy source for the Intermountain REA.

WPB Approves Aluminum Plant for Oregon

WPB approval has been granted for the construction of a $4,000,000 aluminum reduction plant in Oregon for the purpose of investigating the feasibility of recovering aluminum from local alumina clays. The plant will be operated by the Columbia Metals Corp. for the Defense Plant Corp. It will use 5,000 kw. of power to be supplied by the Bonneville Power Administration.

The installation will be in the nature of a large pilot plant. It will work on clays which have been proved up by the U. S. Bureau of Mines in the Hobart and Molalla districts in Oregon and near Castle Rock, Wash.

● CONDITIONAL APPROVAL for the merger of the Utah Light & Traction Co. and the Utah Power & Light Co. as part of a corporate simplification and refinancing program has been granted by the Utah Public Service Commission. Final approval is contingent upon commission approval of bookkeeping entries of the value of properties of the two companies.

WAR STAMPS Will Put You Back in the APPLIANCE BUSINESS

with the APPLIANCE RESTORATION PLAN

ENTHUSIASTICALLY SUPPORTED BY THE WAR SAVINGS STAFF OF THE U. S. TREASURY DEPARTMENT.

SAVE TO SAVE AMERICA—BUY MORE WAR BONDS AND STAMPS

Opportunity knocks! This is your chance to help your country, your fellow-citizens and yourself.

American homemakers desperately need electrical appliances—to replace appliances beyond repair, to provide appliances for new family units, to lighten the burden upon war-workers who must through necessity do their own housework, and to replace human labor diverted into essential industries. Great as the need is it's no secret that no new electrical appliances can be made. But the situation is far from hopeless.

VAST STOCK PILE OF USABLE APPLIANCES WAITING TO BE RESTORED TO SERVICE

In the last 15 years, 179,054,292 small electrical appliances, including 50,848,648 irons, have been sold. These figures show there must be thousands of these appliances lying *idle*—in attics, in cellars, forgotten shelves or drawers. *The pertinent point is that most of these out-of-use appliances are repairable. They must be rooted out, restored to serviceable condition and put in the hands of millions of women who desperately need them.*

HERE'S HOW TO DO IT

1. Buy these restorable out-of-service appliances.
2. Pay for them with WAR STAMPS.
3. Restore them to usable condition.
4. Re-sell them to those who need them.

EVERYBODY BENEFITS FROM THIS PLAN

Original owners of appliances get War Stamps and help others; purchasers get appliances they need and could not buy otherwise; service stations or departments get paid for repairs; dealers get a selling profit; utilities perform a noteworthy, patriotic service; Uncle Sam sells War Stamps; distributors build up future purchasing power for appliances.

Developed by the Proctor Electric Company and presented as a contribution to America's War Effort

START NOW—COMPLETE DETAILS READY

Utility company executives and electrical leagues are urged to write for complete details immediately.

PREPARE YOUR OWN INDIVIDUAL CAMPAIGN with the help of the Appliance Restoration Plan Book and "Action Check List" which explain what this plan is, what it will do, and how you can put it to work immediately.

ADVERTISING IDEAS—Sample layouts to help you prepare advertisements that will pied-piper thousands of these idle appliances from their hiding places.

DISPLAY IDEAS—A suggested compelling window streamer that will stop passers-by and pull owners of idle appliances into your store for the details.

STAMP BOOK ENVELOPE—A simple way to earmark the War Stamps as the first down-payment for the purchase of that after-the-war iron or toaster.

RESALE TAG—A suggested attractive resale tag which certifies that the appliance was bought from its owner with War Stamps and that it has been restored to satisfactory, usable condition.

APPLIANCE *RESTORATION PLAN*

PROCTOR ELECTRICAL APPLIANCES

PROCTOR ELECTRIC COMPANY, *Div. Proctor & Schwartz, Inc., Philadelphia*

UTILITY and ELECTRIC LEAGUE EXECUTIVES

ASK YOUR SECRETARY TO FILL OUT AND MAIL THIS COUPON TODAY

PROCTOR ELECTRIC COMPANY
Div. Proctor and Schwartz, Inc.
Third Street and Hunting Park Avenue
Philadelphia, Pa.

Please send me at once complete information about the Appliance Restoration Plan and your suggestions for our participation in this nation-wide appliance sharing movement.

Name of Utility or Electric League .....

Name .....

Title .....

Address .....

City ..... State .....

INDUSTRY ASKED TO JOIN CONSERVATION CAMPAIGN

"Conservation of fuel, manpower, equipment and materials is a 'must' for the United States, if we are to achieve the maximum war production every American wants."

With this statement, Interior Secretary Harold L. Ickes, Defense Transportation Director Joseph B. Eastman and WPB Chairman Donald M. Nelson announced the broad conservation campaign of which the electric industry's specific savings program is a part.

Although formal endorsement of War Mobilization Director James F. Byrnes was lacking, the Nelson-Ickes-Eastman statement constituted "top-drawer" endorsement of the whole broad program, the electric utility industry's participation in which grew out of a disinclination to attempt a mandatory brownout.

With the statement, representatives of the coal, petroleum, natural and manufactured gas, water communications and transportation industries were called upon to organize task committees similar to that which drew up the electric utility industry's program. It is hoped that all the industries in the over-all program will be ready to put their own programs into operation "early in September."

The over-all campaign will be directed by an inter-agency committee consisting of OWU Director J. A. Krug, Deputy Petroleum Administrator for War Ralph K. Davies, Deputy Solid Fuels Administrator for War H. A. Gray, Eastman and assistants of these men.

"Every pound of coal, every gallon of oil, every cubic foot of gas that can be saved means that our national energy pool is strengthened just that much," the joint statement said. "Every man-hour saved in the production of these basic fuels, in the production of electricity, in transportation and in communications is a man-hour that can be used for something else. . . .

"These savings and the countless others that will result from a broad conservation campaign may appear small in the average household or the average industrial or commercial plant. Multiplied by millions of homes and thousands of factories and stores, however, they are tremendous. The saving of a single ton of coal next winter by one householder will not win the war. But if 18 million householders do it their combined effort will go a long way toward winning the war. That same thing applies with equal or even greater force to each of the other industries represented.

"We have, therefore, called upon the coal, petroleum, electric, natural and manufactured gas, water, communications and transportation industries to join with us in a broad conservation campaign to accomplish these results. The campaign will be voluntary. Cooperation of these industries in asking the public to use their services only as absolutely necessary represents a real sacrifice by them. We ask the American public to appreciate that sacrifice and to give them and the war effort enthusiastic and unstinting cooperation as this campaign develops."

Eva Garry, Colville Indian, has gone to work at Grand Coulee power house, where she helps with the chores. Her ancestors once inhabited the dam site

● NOTICE has been sent by the B. C. Electric Railway Co. to all electrical contractors that additional meters cannot be supplied to areas which are being converted into suites unless these suites are self-contained, that is, having their own kitchen and bathroom.

● A JURY of marketing opinion has been assembled among nearly 5,000 electrical appliance dealers throughout the country together with some 60 major distributors in important cities. This "jury" was announced by Glenn O'Harra, vice-president in charge of sales for the Norge Division of Borg-Warner Corp., after a recent trip to the West Coast. Purpose of the jury is to assist Norge to determine merchandising and promotional methods and profitable lines for dealers to handle after the war.

POWER MEASURE CERTIFIED FOR WASHINGTON BALLOT

Referendum 25, the state public power measure formerly known as Initiative No. 12, has been certified for the 1944 ballot in Washington by the Secretary of State. Final check of signatures to the petitions indicated that 101,511 valid names had been filed as contrasted with a requirement of only 30,000. The original referendum petitions contained 127,232 names but many were invalid because of failure to re-register.

The original sponsors of the initiative, the Washington State Grange, have filed arguments against the measure. However, one of the first arguments favoring the measure came from the Bellingham Central Labor Council and nine signatory unions.

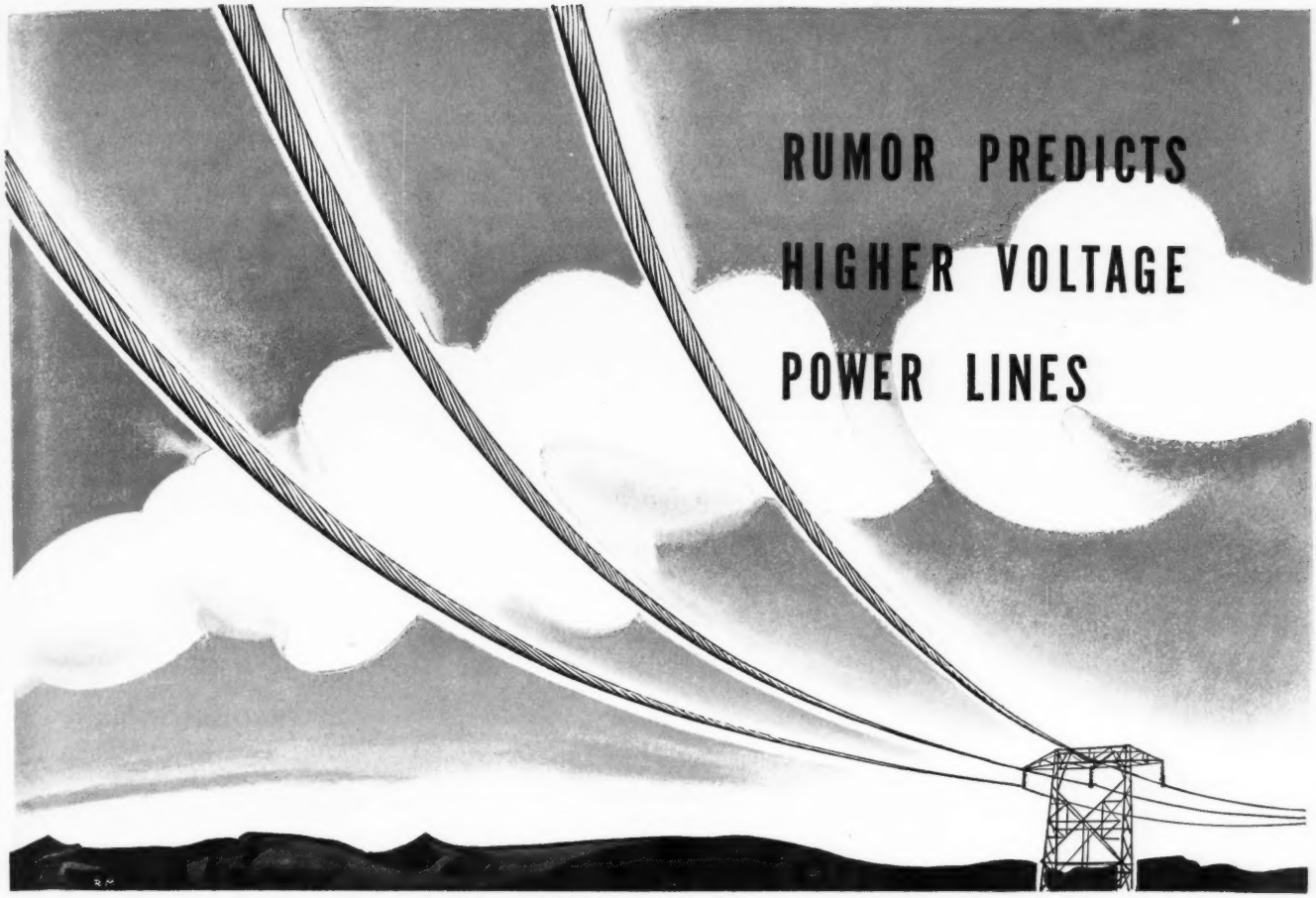
"This measure would place the control of the generating and distributing facilities of this state in government bureaucratic hands," the union argument said, "which would bring about a serious loss of rights to the people of this state. We oppose any measure that will tend to place control of this vital power in the hands of the government bureaucrats. The rights of the American working people should be protected from the threat of dictatorship."

Municipal Power Plant Announces Rate Increase

San Luis Valley, Colo., papers this month carried an announcement reading substantially as follows: "An increase ranging from 12 to 20% in the electric rates within the town of Center on both residential and commercial customers was announced by the municipal power plant through publication of a new schedule of electric and power rates appearing in the Center *Post-Dispatch*. The increased rates became effective on July 1, 1943. Insufficient revenue to pay operating expenses was given as the reason to increase electric rates."

The Center generating plant has completed one full year of operation under municipal management. To date, only 4% interest payments on the $125,000 revenue bonds has been required. On March 1, 1944, however, the first payment on principal (some $4,000) will be due and expected profits have failed to materialize.

Center voted to construct its own energy-producing system in 1941, shortly after Public Service Co. of Colorado initiated a lower rate schedule for the entire San Luis Valley; the same rates still prevail in all San Luis Valley communities served by the power company.



"Bigger and better, with voltages much higher," say the men who should know about postwar transmission lines. Alcoa's engineers aren't making predictions; they've been too busy operating their own power lines, keeping abreast of Alcoa's ever-growing output of aluminum, and seeing to it that others got maximum service from their A.C.S.R. lines.

But there'll be Aluminum Cable Steel Reinforced ready to meet this demand, when it comes, just as there has been for every power line need in the past. A.C.S.R. made by Alcoa, is carrying the power on the smallest of rural lines and the largest of transmission lines. It continues to prove its ability to stay on the job.

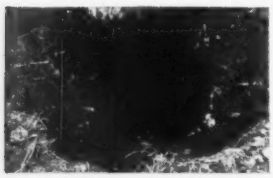
If your thinking on postwar power lines has reached the Imagineering stage—or on any other subject which might involve the use of Alcoa Aluminum Alloys—our engineers will be glad to work with you. Write ALUMINUM COMPANY OF AMERICA, 2132 Gulf Building, Pittsburgh, Pennsylvania.

OSMOPLASTIC

SCORES A 4-ROUND KNOCKOUT OVER GROUNDLINE DECAY

ROUND 1

Dig earth from around pole to a depth of approximately 14 inches from the groundline. Then remove the loose decayed wood in the treatable zone.

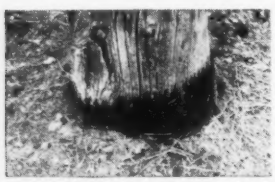


ROUND 2

Apply OSMOPLASTIC by brushing or daubing on the cleaned surface from 6 inches above to 12 inches below the groundline level.

ROUND 3

Wrap the Osmose bandage around the treated area. This protects and retains the Osmoplastic until the Osmosalts penetrate into pole.



ROUND 4

Back-fill the hole and the operation is completed. Osmoplastic protection adds many extra years service to standing poles.

Write for full information TODAY!

OSMOSE

WOOD PRESERVING COMPANY OF AMERICA, INC.

DENVER

SEATTLE • BUFFALO • SAN FRANCISCO

BIG THOMPSON PROJECT MAY BE REVIVED

Possible resurrection of the Colorado-Big Thompson electric power and irrigation project was indicated when California Congressman Albert E. Carter, member of the National House of Representatives' sub-committee on appropriations, visited the site July 20 and 21, accompanied by Bureau of Reclamation engineers, including Chief Engineer S. O. Harper.

The sub-committee recently approved a three and one-half million dollar appropriation for continued work, but WPB has, to date, refused to release necessary material, and activity on the Big Thompson job has been cut to mere maintenance essential to preservation of work already accomplished.

Congressman Carter was enthusiastic over the "wonderful possibilities for Colorado" through completion of the project, and stated that power revenues will go a long way toward amortizing construction costs.

Holding Company Offers to Sell Idaho Power Stock

As part of a voluntary program to comply with section 11(b) of the Holding Company Act, Electric Power & Light Co. proposes to sell its entire common stock interest in Idaho Power Co. after making a capital contribution of some 60,000 shares to the Idaho utility. In addition Electric P&L will make a capital contribution of 3,670 shares of Idaho $100 preferred.

These contributions are to enable Idaho Power to comply with FPC and Oregon and Idaho regulatory commissions as regards accounting under an original cost proceedings. The stock to be sold totals 90,000 shares of $100 common.

Power Flow Study Available For California Streams

Regulation of the flow of Mill and Deer creeks in Tehama County, Calif. would aid present and proposed irrigation and would be of considerable value for flood control, it was announced by the Department of the Interior, following a study of the potential water power of the two bodies by the U. S. Geological Survey. Potential power of the two basins, on the basis of the estimated longtime flow, is about 100,000 hp., according to the survey report.

Manuscript copies of this report, containing an inventory of the water supply of the two basins and maps showing the location of several proposed reservoir and power sites, may be consulted at offices of the Geological Survey at Washington, D. C. and in San Francisco. Mimeographed copies containing text and tables but without illustrations are obtainable upon application to Director, Geological Survey, Washington, D. C.

Puget Sound Stock Near Par In Tentative Trading

Tentative trading in Puget Sound Power & Light Co.'s new common stock early last month brought "when issued" offers ranging around $9 per share. Asked prices were holding at, or slightly above, the $10 per share par value accorded in the recapitalization program, under which the utility's preferred stockholders will take over voting control from Engineers Public Service Co. and other present common stockholders.

According to the plan, the new common stock will be traded for the present $6 preferred on a ratio of eight shares of the new for one of the old and for the present common stock at one share of the new for 20 shares of the old.

Although the recapitalization has been approved by state and federal authorities, the new stock cannot be issued until a prescribed "waiting period" has elapsed.

Sacramento Now Flowing Through Diverson Tunnel

Entire flow of the Sacramento River has been turned into the diversion tunnel at Shasta Dam, it was announced by the Bureau of Reclamation last month. The tunnel was used by the S. P. railroad as a by-pass around the construction area until March 1942, when the new rail route was completed.

With the river flowing through the tunnel, a cofferdam across the river bed above the tunnel outlet will prevent backwater from interfering with the placing of the spillway apron.

● An Industrial Survey of Seattle and King County was made available by Bonneville Power Administration last month as the tenth in its series of reports on Puget Sound communities. Favorable location of the city for an air terminal in postwar flight lines to Northern Asiatic and European points coupled with increased commerce through development of Alaska should bring future growth, according to the report. Thirty-two potential industrial sites comprising a total of 1,621 acres are listed.

UPTEGRAFF

distribution TRANSFORMERS

Uptegraff

The Time, the Type *and* the Capacity

Over the engineering boards and into production on schedule, your Uptegraff Transformers are shipped to you "as promised" with remarkable certainty.

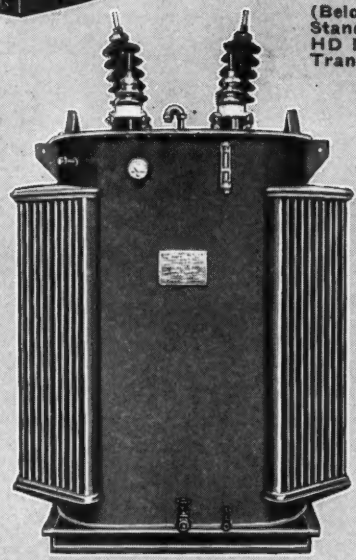
Into the design go all the "important little things" that are the distinguishing marks of "Quality and Service" in Uptegraff Transformers—the promise that in the time to come on the job you will get years of service stretching far beyond normal expectancy.

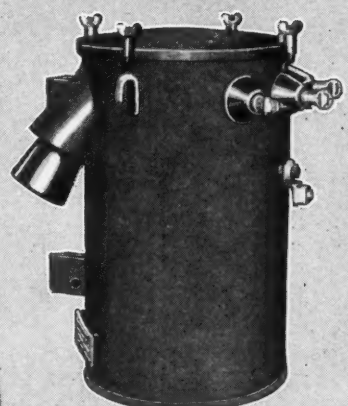
Our forces and our plant are today equipped better than ever before to deliver, and deliver on schedule, any and all the types and sizes of Transformers that characterize this line of "Quality and Service" Transformers.

Tell us what you want, when you want it, and see us meet your requirements.

Type AD Non-Inflammable Distribution Transformers

(Below) Standard type HD Distribution Transformer

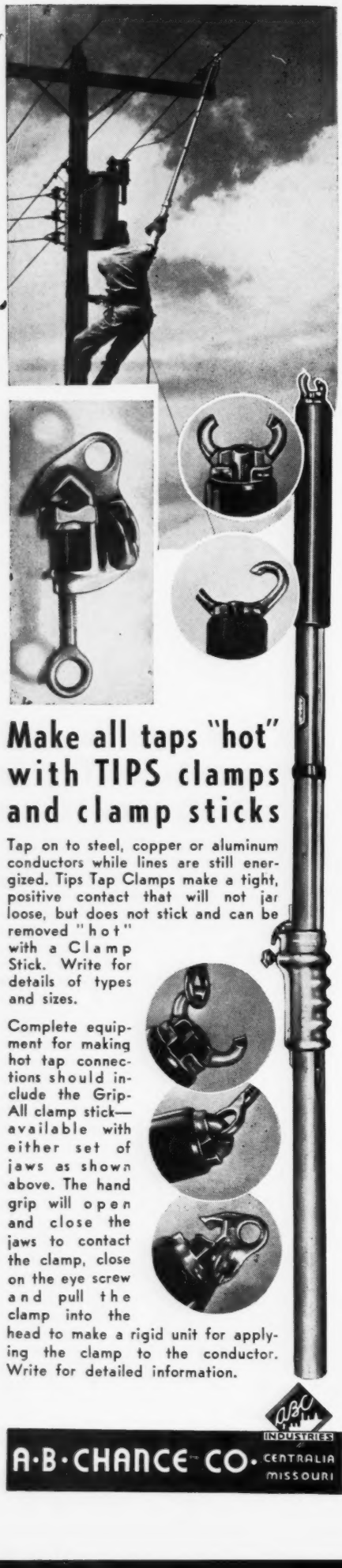




Type UD Distribution

R·E·UPTEGRAFF MANUFACTURING CO·

SCOTTDALE PENNSYLVANIA U·S·A·



Make all taps "hot" with TIPS clamps and clamp sticks

Tap on to steel, copper or aluminum conductors while lines are still energized. Tips Tap Clamps make a tight, positive contact that will not jar loose, but does not stick and can be removed "hot" with a Clamp Stick. Write for details of types and sizes.

Complete equipment for making hot tap connections should include the Grip-All clamp stick—available with either set of jaws as shown above. The hand grip will open and close the jaws to contact the clamp, close on the eye screw and pull the clamp into the head to make a rigid unit for applying the clamp to the conductor. Write for detailed information.

A·B·CHANCE CO. CENTRALIA MISSOURI

GENEVA STEEL PLANT WILL GENERATE OWN POWER

Full utilization of the power resources and facilities of two industries, the steel and electrical utility, will be made in the unique cooperative agreement between the Columbia Steel Co. at the new Defense Plant Corp. plant being built by it at Geneva, Utah, and Utah Power & Light Co. This was disclosed by officials of the steel company in explanation of the electric facilities now being installed to serve the new $150,000,000 steel plant which is nearing completion.

Columbia Steel's plant generating system on the property will eventually furnish the 13.8 kv. required for operation from its own 62,500-kva. generator. Power will be taken from Utah Power & Light's new 138-kv. transmission line recently built to serve the plant until the generating station is completed. After that the two will interchange, the utility furnishing service while the generator is out of service or for extra demands, the generator turning power into the utility's lines above the mill demands when required.

The Geneva plant is an integrated steel mill, complete from raw materials to finished plate or structural members. It has its own coal and iron ore mines nearby, its own limestone quarries. Four batteries of by-product coke ovens will furnish the coke for metallurgical purposes and by-products and benzol from corollary facilities. Three blast furnaces will supply pig iron or hot metal to a battery of basic open hearth furnaces, which in turn will provide steel ingots with which to feed the 45-in. slab mill. Slabs will be further rolled in the 132-in. plate mill and in the structural mill to make finished products.

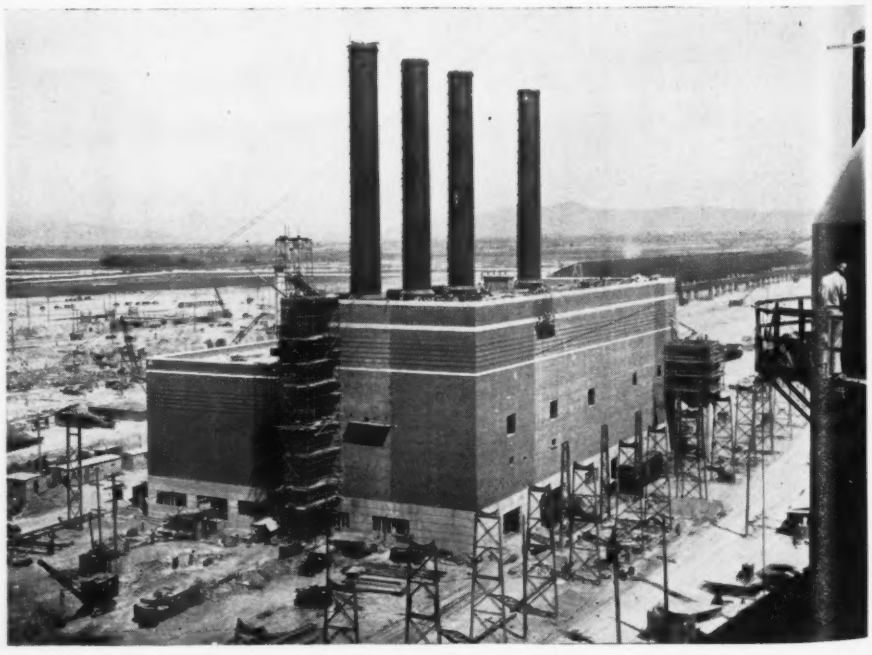
Electric power to supply initial requirements is being served by Utah Power & Light Co. from a 138-kv. transmission line. A 40,000-kva. bank of transformers, with regulators, reduces the 138 kv. to 13.8 kv. for distribution by underground cable system to the main switchgear located in a switch house. Distribution is made from this switch house throughout the plant at 13.8 kv. by means of underground electrical cables.

The plant's own generating system will consist of a 62,500-kva. generator which will deliver power at 13.8 kv. to the switch house main bus. It will be driven by a steam turbine, operating at 450-lb. pressure, 760° temperature. Steam will be generated by three 300,000-lb.-per-hour boilers and two 150,000-lb.-per-hour boilers, burning blast furnace gas wastes, with pulverized fuel to supplement them under certain operating conditions.

Distribution at 13.8 kv. is taken to unit substations at the coke plant, sinter plant, open hearth area, shops, motor rooms, slab mill, plate mill and structural mill. In the mill motor rooms are located the main motor-generator sets which convert the 13.8 kv. to 700 volt d-c for the main drive motors. Here also are mercury arc rectifiers to supply 250-volt d-c for mill auxiliary motors. The main drive motors are operated at 13.8 kv., 60-cycle, a-c. Alternating current motors between 200 and 1,500 hp. are supplied

(Continued on Page 88)

Power house under construction at new Defense Plant Corp. steel mill at Geneva



FOR THE second time in less than a year Electromaster men and women have received the Army-Navy Production Award. Their new "E" pennant, flying so bravely alongside the Minute Man and Old Glory, carries a star in its field of blue.

Electromaster is naturally proud of this new honor—but prouder still of the loyal, hard-working employees who earned it. For them, however, the greatest honor of all is the simple privilege of working, doing their utmost to preserve and defend this country and its institutions. They will continue. We promise it.

ELECTROMASTER INC.

1811 E. ATWATER STREET • DETROIT, MICHIGAN

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VICTOR, NEW YORK

Distributed by MAYDWELL & HARTZELL, Incorporated

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2,300-volt a-c; motors from 1 to 200 hp. operate from 440-volt, 60-cycle supply.

Control of the primary distribution system is remote. By means of supervisory control located at the switch house, the operator has control and indication of all primary switching and important secondary switching, as well as control of all primary switching on all lighting circuits throughout the plant. Thus, by opening the main breakers in the substation and motor rooms, complete blackout can be accomplished through the operation of a few remote control switches. This supervisory system permits the substations and motor rooms to be unattended.

All 13.8-kv. switchgear on primary distribution is of the air blast type. This is the first large steel mill installation with this type of switchgear in this country. Throughout the plant the engineers have minimized the use of oil circuit breakers and use air breakers of various types to minimize hazards. Equipment of all types has been furnished by a variety of manufacturers in order to supply the extraordinary needs of so large an installation.

Total demand by the plant when in full operation is anticipated to be approximately 41,000 kw.

Further technical details of this extraordinary installation may be forthcoming in later issues after the plant goes into operation.

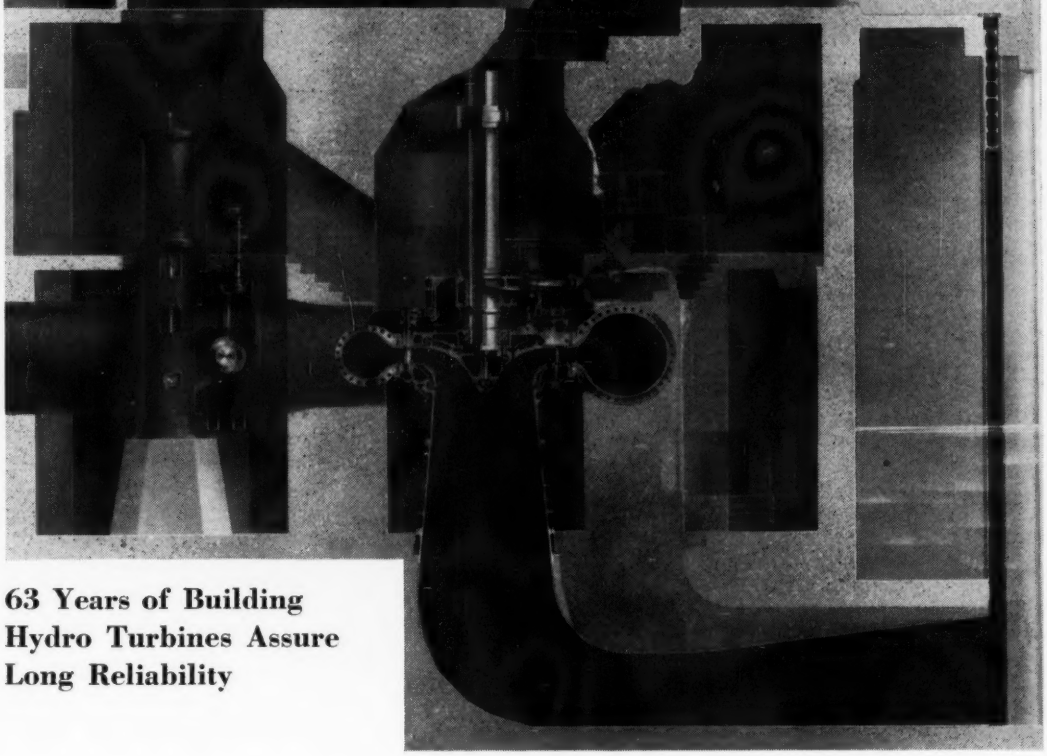
● APPLICATION has been made by the City of Redding for a block of power from Shasta and Keswick dams for the municipal electric system. A letter has been written to Ralph Lowry, USBR construction engineer at Shasta Dam, formally requesting power when available and pointing out that the city has funds available for the construction of a line to the plant.

● FEDERAL LIGHT AND TRACTION CO.'s offer to sell the Tucson Gas, Electric Light & Power Co. to the city of Tucson for $9,100,000 has been withdrawn. This action followed a recommendation by a citizens' power committee opposing the purchase.

● PRESIDENT ROOSEVELT has signed a bill authorizing the city of Anchorage, Alaska, to issue not more than $1,250,000 worth of bonds for the purchase of the generating plant of the Anchorage Light and Power Co., Inc.

● WITH A $345,000 allotment from REA the Sulphur Springs Valley (Ariz.) Electric Cooperative is acquiring the facilities of the Southern Arizona Public Service Co. in Wilson, Benson and St. David.

Four 50,000 H.P. PELTON TURBINES for Pit No. 5



63 Years of Building Hydro Turbines Assure Long Reliability

BUY WAR BONDS

Here is a cut-away-view of one of four reaction-type turbines for Pacific Gas and Electric Company's hydro-electric achievement at Pit No. 5.

Designed and built by Pelton, it has all the design features that have proved more reliable and more efficient throughout the history of turbine development. The effective head of these big fellows is 587 Feet; speed, 300 R.P.M.

For 63 years Pelton has been continuously improving hydraulic prime movers and this accumulation of laboratory and field development offers utilities more kilowatts at less cost.

THE PELTON WATER WHEEL COMPANY

Hydraulic Engineers

2929 NINETEENTH ST., SAN FRANCISCO, 10

EXCLUSIVE WESTERN REPRESENTATIVES for Baldwin-Southwark Division of Baldwin Locomotive Works, Baldwin-De La Vergne Sales Corp., Woodward Governor Co. and Cone Valve Division, Chapman Valve Mfg. Co.

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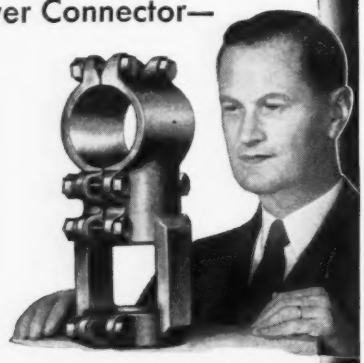
Paschall Station PHILADELPHIA

BLW THE BALDWIN GROUP

PELTON

Subsidiary of THE BALDWIN LOCOMOTIVE WORKS

"When you need ANY Power Connector—

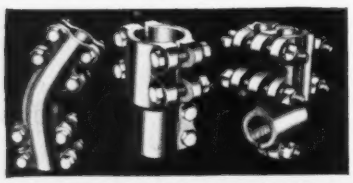


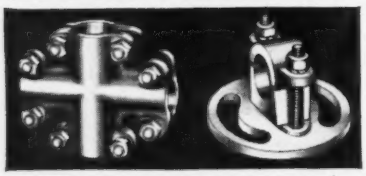
—see the **COMPLETE** line"

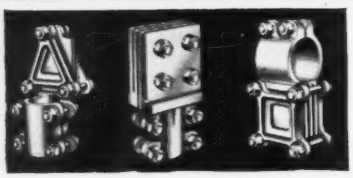
Probably the exact Power Connector you want is shown in the Penn-Union Catalog.

You will find Tee, Stud and End Connectors, Bus Supports, Terminals, Elbow and Cross Connectors, Couplers and Reducers—

—each in a wide range of sizes, up to the largest. Here are a few of the many types:







Also the most complete line of Cable Taps, Straight and Parallel Connectors, Lugs, Grounding Clamps — every good type.

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F. M. NICHOLAS CO.
1123 Harrison St., San Francisco

NORTHWESTERN AGENCIES
2411 First Ave., Seattle, Washington

Penn-Union Electric Corp., Erie, Pa.

PENN-UNION
Conductor Fittings

MORE DATA SECURED ON BOMBING OF GERMAN DAMS

Technical plans for the bombing of the Mohne and Eder dams by the RAF were based upon experience gained in an abortive attack on an Italian dam many months ago, according to data just received from the British Information Service. Torpedos were used but it was found that these missiles did not carry sufficient explosives. However the Germans mounted torpedo nets across the face of dams and increased anti-aircraft protection, particularly against low flying planes.

Experts decided that the only way to force a breach in the dams was to supply a series of rapid and heavy high-explosive pushes *under water*. The missile decided on was the sea mine because it has a greater weight of explosive in proportion to the weight of the case than does a bomb. Four-motor bombers would be required because a whole series of these mines from several aircraft in succession would be necessary to blast the 100-ft. thick masonry dams.

"Planning the attack involved very onerous decisions," the report continued. "It was seen, for instance, that only a *very* low-level attack would have much chance of success. In actual fact, Wing-Commander Gibson, V.C., D.S.O., D.F.C., who led the flight, went in at only twenty feet above water level. And most of the following aircraft went in at this height.

"Such a plan involved the attacking forces in two great hazards. It was known that a large concentration of low flak had been mounted in the dam towers and on the banks, and thus the aircraft would have to meet a tremendous amount of virtually point-blank fire. Also, such a low-level attack exposed the aircraft to heavy risks of blast from the exploding mines. It is believed that some of the eight missing bombers were, in fact, destroyed by this cause. (There is a story, not from official sources, that one Lancaster was seen caught on an upflung tower of water a hundred feet high—just like one of those jet-suspended balls in a shooting gallery—and flung like a toy airplane into the lake.)

"The crews who went knew all about those hazards and accepted them fully. Split-second timing of the assault by each aircraft was also necessary if the required explosive force was to be exerted and the operation have a chance of success. And the utmost precision in aiming the mine was necessary so that they would slap up against the face of each dam. No easy matter for an aircraft flying at about 300 miles an hour in the face of withering fire!

"So at an English aerodrome the selected aircrews with the bombers they would use went into endless practices and rehearsals. They practiced till every man, from the gunners who would have to put up a blanket of fire against the defenses, to the pilots and bombardiers, knew their jobs to a hair's breadth. They practiced till each aircraft could drop its dummy mines between a pair of rugby goal-posts beneath the crossbar, and in line with the posts.

"There lie the real reasons for the astounding success of this desperate venture. First, the most meticulous planning and timing. Second, sheer perfection in practice and training. And only third, the fortitude of the crews who did the job. For without the first two factors all the courage in the world would have been of no avail."

San Diego G & E Puts Mechanical Employees on 48-Hour Week

Mechanical employees of the San Diego Gas & Electric Co. have been placed on a 48-hour week. The order does not affect office workers. According to L. M. Klauber, vice-president and general manager, War Labor Board approval was required for the move because of an existing contract with the IBEW which called for double time on Saturdays. Under the new arrangement the men will be paid only time and a half for Saturday work.

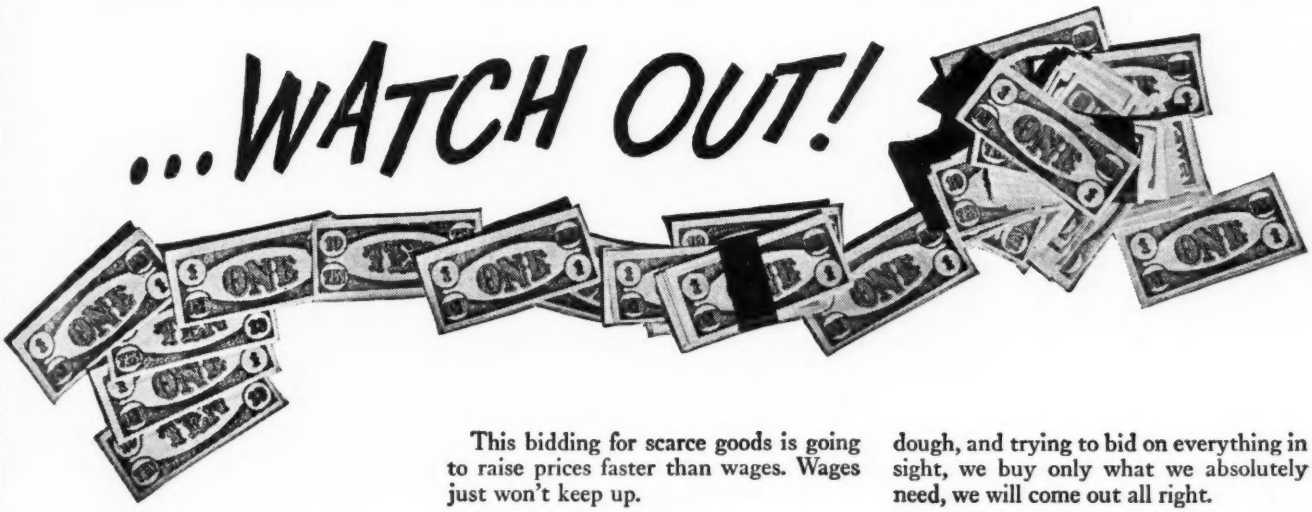
● THE ARMY has intervened in the Utah Public Service Commission's proceedings against the Utah Power & Light Co. for lower rates. The Ninth Service Command estimates that upwards of $860,000 worth of electric power will be purchased from Utah P&L in the next year and asserts that any distribution of possible rate savings should apply to schedules under which this service is furnished.

● TWO CONTRACTS involving a total expenditure of approximately $31,000 recently were awarded B. C. Electric Railway Co., Ltd., Vancouver, by the department of munitions and supply, Ottawa. One award amounts to $16,000 and is for supply and installation of a power line in British Columbia, exact location withheld. The other job totals $15,000, covers work at an airport.

● THE COWLITZ COUNTY (WASH.) PUD has entered into a contract with Guy C. Meyers of New York whereby Meyers will act as fiscal agent for the district in negotiations for the possible purchase of the Ariel development on the Lewis River. The project is owned by Pacific Power and Light Co.

IF YOU'RE MAKING MORE MONEY

...WATCH OUT!



WE WANT TO WARN YOU, before you read this page, that you've got to use your head to understand it.

We also want to warn you that—if you don't bother to read it carefully enough to understand it—you may wake up after this war as poor as a church mouse.

• • •

This year Americans are going to make —minus taxes—125 billion dollars.

But this year, we civilians are not going to have 125 billion dollars' worth of goods to spend this on. We're only going to have 80 billion dollars' worth. The rest of our goods are being used to fight the war.

That leaves 45 billion dollars' worth of money burning in our jeans.

Well, we can do 2 things with this 45 billion dollars. One will make us all poor after the war. The other way will make us decently prosperous.

This way the 45 billion dollars will make us poor

If each of us should take his share of this 45 billion dollars (which averages approximately $330 per person) and hustle out to buy all he could with it—what would happen is what happens at an auction where every farmer there wants a horse that's up for sale.

If we tried to buy all we wanted, we would bid the prices of things up and up and up. Instead of paying $10 for a dress we're going to pay $15. Instead of $5 for a pair of shoes we're going to pay $8.

This bidding for scarce goods is going to raise prices faster than wages. Wages just won't keep up.

So what will people do?

U. S. workers will ask for more money. Since labor is scarce, a lot of them will get it. Then farmers and business men who

feel the pinch are going to ask more money for their goods.

And prices will go *still higher.* And the majority of us will be in that same old spot again—only worse.

This is what is known as Inflation.

Our government is doing a lot of things to keep prices down . . . rationing the scarcest goods, putting ceiling prices on things, stabilizing wages, increasing taxes.

But the government can't do the *whole job.* So let's see what *we* can do about it.

This way the 45 billion dollars will make us prosperous

If, instead of running out with our extra dough, and trying to bid on everything in sight, we buy only what we absolutely need, we will come out all right.

If, for instance, we put this money into (1) Taxes; (2) War Bonds; (3) Paying off old debts; (4) Life Insurance; and (5) The Bank, we don't bid up the prices of goods at all. And if besides doing this we (6) refuse to pay more than the ceiling prices; and (7) ask no more for what we have to sell—no more in wages, no more for goods—*prices stay where they are now.*

And we pile up a bank account. We have our family protected in case we die. We have War Bonds that'll make the down payment on a new house after the war, or help us retire some day. And we don't have taxes after the war that practically strangle us.

Maybe, doing this sounds as if it isn't fun. But being shot at up at the front isn't fun, either. You have a duty to those soldiers as well as to yourself. You *can't* let the money that's burning a hole in your pocket start setting the country on fire.

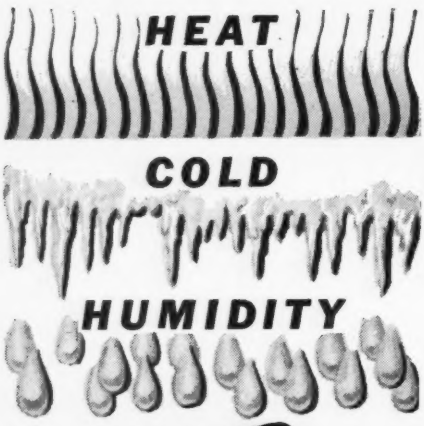
★ ★ ★

This advertisement, prepared by the War Advertising Council, is contributed by this Magazine in co-operation with the Magazine Publishers of America.

KEEP PRICES DOWN!

Use it up
Wear it out
Make it do
Or do without

INSURANCE AGAINST



THERMATITE TREATED

THERMADOR TRANSFORMERS

Thermador Transformers are Thermatite treated to withstand extreme temperatures and humidity—arid or moist heat—dry or damp cold do not hamper their efficiency. Thermatite is the name of a process of accurate heat controlled vacuum impregnation developed and improved over a period of ten years.

Thermador also manufactures built-in Electric Heaters, Electric Ranges, Electric Water Heaters.

THERMADOR
Electrical Manufacturing Co.
5119 S. Riverside, Los Angeles
Seven Leagues Ahead

OWU RULING ON RURAL LINE EXTENSIONS

After critical re-examination of its policy on rural line extensions longer than 5,000 ft., the Office of War Utilities has decided to allow such extensions as in the past wherever they meet all the specifications of Order U-1-c and can be constructed within material allotments.

The decision was reached after processing of applications for lines longer than 5,000 ft. had been held up for some time pending careful study of the situation. More than 100 requests for authorizations covering miles of new line had been received from all over the country.

Henceforth, the Power Division of OWU will require sufficient information to demonstrate that proposed hookups will make effective use of electricity in increased food production or to save farm labor. Applications must include lists of farms to be served and the animal units and equipment available on each. Where additional animal units are needed to justify proposed extensions, the County War Board will be asked to verify the reasonableness of the proposed additions.

One important decision reached in the study was that the animal units on the farm or farms to be serviced by a given extension must be sufficient to meet U-1-c standards. No excess of animal units on one farm may make up for a deficiency on another farm unless both farms are on the same extension. No such overlapping will be allowed system-wide. The Power Division will require assurances that no farm with less than five animal units has been included in the justification for any proposed extension and that no such farm, non-farm residence, school or church will be connected.

Use of copperweld steel conductor manufactured from Signal Corps rejects will be authorized to the extent that it is available in cases of long extensions where there is question as to the feasibility of steel primaries only. Copperweld from excess stocks is permissible where it is required for greater conductivity or where too great delays in obtaining steel exist. All copper for secondaries and service drops must be obtained from excess stocks, except that copperweld from Signal Corps rejects may be so used.

It was emphasized that quarterly allocations from the Power Division's materials allotments will be made to the farm extension program, and that rural line construction in any one quarter must be limited strictly to the allotment for that quarter.

● Recent Relaxation of restrictions governing new rural power line connections in British Columbia is resulting in a number of service additions, according to B. C. Electric Railway Co. representatives. Applications to the metals controller must contain proof that electric light and power service will maintain or increase production of needed farm produce, such as eggs and dairy products. Where these conditions are met and the connection does not use more than 600 ft. of non-ferrous metal or 30 lb. of copper, no application to the metals controller is needed.

PEOPLE
made this news

Charles A. Dostal Elected Westinghouse Vice-President

Charles A. Dostal of San Francisco has been elected a vice-president by Westinghouse Electric & Mfg. Co. He will continue as Pacific Coast manager, a position he has held since 1939.

Dostal has been with Westinghouse for almost 37 years, having joined the company in 1906 as an apprentice at the East Pittsburgh Works. Since then he has been salesman; has served in the Lamp company, first as assistant at Bloomfield, N. J., then successively as manager of the Middle Atlantic Division, at St. Louis and Chicago. When the electric refrigeration department was organized in 1931, Dostal was made regional sales manager in charge of the Pittsburgh, Chicago and St. Louis merchandising districts. Later he was named Northwestern district manager for all Westinghouse Electric Appliance division products at Chicago.

In August 1942, Dostal received the Westinghouse Order of Merit for distinguished service.

● Herb Strandberg, electrical engineer, Seattle City Light, and newly-named chairman of the Seattle section, AIEE, recently went to Cleveland and East Pittsburgh. He represented the Seattle section at the annual AIEE convention, and in Pittsburgh, witnessed circuit breaker tests at the Westinghouse high power testing laboratory.

● Prof. Floyd A. Decker, from the Department of Electrical Engineering at the University of Texas, El Paso, has been made associate professor of engineering at University of New Mexico, Albuquerque.

EASY TO ASSEMBLE METAL PARTS ON

ILLINOIS POTHEAD PORCELAIN

★ The top and bottom surfaces of ILLINOIS Pothead Porcelain are absolutely parallel. End surfaces are ground by special machinery when required.

Perfect assembly, so important to the pothead manufacturer, is assured—a feature which increases production efficiency.

Another step in the manufacture of ILLINOIS Pothead Porcelain is that of gaining exact dimensions—this is accomplished through profile control which makes possible uniform contour as well as accurate dimensions.

• HIGH DIELECTRIC STRENGTH •
HIGH MECHANICAL STRENGTH •
EXACT DIMENSIONS AND UNIFORMITY •

ILLINOIS ELECTRIC PORCELAIN CO.
MACOMB ILLINOIS

Solder
PROHIBITED
or Restricted
by 4 Government Regulations
....And here's the IDEAL Solution to the Problem!
IDEAL Wire-Nuts
Meet ALL Government Requirements
An ALTERNATE and IMPROVEMENT
for Solder and Tape

IDEAL "Wire-Nuts" (Solderless, Tapeless, Wire Connectors), contain no copper or copper alloys—no tin, or rubber as used with solder-and-tape joints. Every time you use "Wire-Nuts" you conserve vital materials needed for the War Program. Easy to use; strip wire, screw on, that's all! Make a neater, safer joint: better Electrically; stronger Mechanically. Fully Approved. Listed by Underwriters' Laboratories, Inc. Sizes for connecting all combinations from two No. 18 to three No. 10, solid or stranded wires. IMMEDIATELY AVAILABLE.
Prompt Delivery
IDEAL Sycamore
• IDEAL COMMUTATOR DRESSER CO •
IDEAL COMMUTATOR DRESSER COMPANY
WEST COAST WAREHOUSE STOCKS:
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F. M. Nicholas Co., 1123 Harrison St., San Francisco, Cal.
L. S. Foley, 1233 N. W. 12th Avenue, Portland, Oregon
Robinson Sales Co., 3215 Western Avenue, Seattle, Wash.

ALL KINDS
of SMALL
TRANSFORMERS

—in the JEFFRIES line

Practically all your small transformer needs are supplied by the Complete Jeffries line. We have specialized for years in providing transformers to exactly match your requirements. If not in our regular line, we build to meet your specifications—in a hurry!!

Minimize your voltage losses. Specify scattered transformers to eliminate duplicate conduit runs, and save on power costs.

JEFFRIES TRANSFORMER COMPANY
1710 E. 57th St. Los Angeles, Calif.

Heston Joins McGraw-Hill Editorial Staff

Walter C. Heston has joined the staff of ELECTRICAL WEST as engineering editor, taking over for the duration the duties formerly handled by Capt. Wayne Snowden, now in the U.S. Army, somewhere in Africa or Europe. Heston will also be the Pacific Coast editor for *Electrical World*, a position he held from 1922 to 1932, joining McGraw-Hill after practical experience with the Portland Railway Light & Power Co. During the depression he worked on power line construction, then later was with the Public Utilities California Corp.

In 1939 he joined the lighting staff of Pacific Gas and Electric Co., San Francisco, then became industrial engineer for the Northern California Electrical Bureau where for two and a half years he carried on the successful wiring modernization program. For the past year he has been teaching electric appliance repair courses at Samuel Gompers Trade school and night classes in electrical theory and shop practice.

John C. Page Resigns as Reclamation Commissioner

Resignation of John C. Page as commissioner of reclamation and his appointment as consulting engineer for the bureau with headquarters at Denver has been announced by the Interior Department. Harry W. Bashore will head the bureau pending appointment of a permanent successor to Page.

Page's resignation was due to illness. Reclamation commissioner since 1937, he has been associated with the bureau continuously since 1911. He was chief administrative assistant on the Boulder Dam project from 1930 until he went to Washington in 1935.

California Edison Men Awarded EEI Medal

The Edison Electric Institute medal was awarded recently to two Southern California Edison Co. men—John F. Cleary, class "A" transmission patrolman, and John S. Smith, first class lineman, Redlands.

Cleary performed successful artificial respiration upon Merwin Fryer, 11, on Aug. 11, 1942, after the boy had touched a 4-kv. wire which had fallen to the ground following an automobile accident in Compton. J. A. Mann, substation division superintendent, Paul Hartung, guard, and C. S. Shipley, electrician, Lighthipe substation, aided in the rescue.

Harold C. Anderson, totally blind war worker at the Westinghouse plant in Emeryville, Calif., shares lunch with Duke, Seeing-Eye dog. In background is coil winding machine at which Anderson works

Smith saved the life of Leland R. Schuessler, lineman, after he accidentally contacted a 4-kv. circuit on Sept. 14, 1942. After about two minutes of pole-top resuscitation, the injured man began to breathe without assistance. G. H. Fuller, apprentice lineman, helped in the rescue.

● A. B. CAMPBELL, until recently associated with Edison Electric Institute and well known on the West Coast, has joined Hughes Brothers of Seward, Neb., manufacturers of transmission and distribution equipment. Campbell went with the National Electric Light Assn. in 1923 and, after that organization was dissolved, continued with EEI.

● JAMES FLETCHER has been appointed Seattle branch manager of General Cable Corp., according to James Crilly, Pacific district manager. He succeeds Walter Wallace who recently was made assistant director of manufacturing at General Cables, Bayonne, N. J., factory. Fletcher was formerly with the San Francisco office.

● R. E. FISHER, vice-president of Pacific Gas and Electric Co., has been appointed San Francisco chairman for the National Committee for Economic Development.

● R. A. CROSBY, formerly illuminating engineer for Los Angeles Gas & Electric Co., later Bureau of Power & Light, is a captain in the Marine Corps and stationed in San Francisco.

● A. E. WISHON, vice-president and assistant general manager of Pacific Gas and Electric Co., has been elected to the board of directors of the American President lines.

● GEORGE B. KENLINE, formerly San Diego Gas & Electric, is first lieutenant, U. S. Army, in New Jersey.

● LIEUT. C. H. ENKING, formerly with Idaho Power Co. at Boise, has returned to Boise from Miami Beach.

OBITUARY

Carl E. Heise

Carl E. Heise, whose rotund figure and round derby hat were an industry trade mark, and who retired in 1941 after 43 years with Westinghouse Electric & Mfg. Co., San Francisco, died June 30 in that city. Born Aug. 10, 1876, he was graduated from University of California in 1898 with degree of B.S. in electrical engineering. He went to work for Westinghouse, installing motors and shooting trouble, took the test course at East Pittsburgh and returned to San Francisco. In 1912 he entered sales work and was made San Francisco district manager. In 1940 he was placed on special assignments and in 1941 retired.

Mr. Heise was one of the organizers of the San Francisco Electrical Development League and a past president, a member of the Pacific Coast Electrical Assn. executive committee and of the executive committee of the Southwestern Section, International Association of Electrical Inspectors.

George T. Bigelow

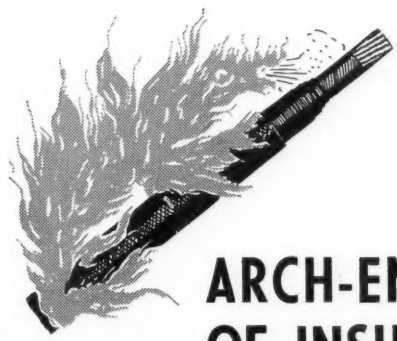
George T. Bigelow, retired manager of the commercial department, California Electric Corp., Riverside, died July 2. He had retired from the company March 1, 1942, because of ill health. He was born in San Francisco in 1882.

Mr. Bigelow, formerly secretary of the Riverside Chamber of Commerce, joined the Southern Sierras Power Co. in 1918 in the executive department, was transferred to the commercial department in 1919 and in 1921 was made assistant general agent upon the retirement of E. B. Criddle, the general agent in 1932. Mr. Bigelow was chairman of the Commercial Section, Pacific Coast Electrical Assn., during the year 1930.

● ROY WALLENSTEIN, division sales manager of Utah Power & Light Co. at Rexburg, Ida., died of heart attack June 28.

MERCHANDISING DIRECTOR

Salary $10,000 to $15,000 per year. Permanent position. Applicant to qualify must have selling, organizing and executive ability, plus engineering training. Age 40 to 47. Replies to be held in strict confidence. Our organization knows of this advertisement. Write Box 73, Electrical West, 68 Post Street, San Francisco, Calif.



ARCH-ENEMIES OF INSULATION

HEAT • FIRE • FUMES • OIL • GREASE • MOISTURE

Ordinary wire insulation is in constant danger of falling prey to these ever-present dangers. But they are no menace to Rockbestos Permanently Insulated wires, cables and cords. Rockbestos Products are designed to operate without failure under the most severe conditions. If you plan your wiring for permanence, dependability and economy, specify Rockbestos.

Marwood production technicians are at your service at all times. And through Marwood, there is also available to you the services of one of Rockbestos' ablest engineers. If you plan to wire, or to rewire . . . or if you need expert assistance in solving your wiring problems, consult

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FOR BUSINESS AND PERSONAL ACCOUNTS

Merchants, professional people, office workers . . . all types find our Mailway service the most convenient way of banking. They make deposits any time, night or day, Sundays or holidays. Our special Mailway envelopes and passbook assure quick and safe service.

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HART MANUFACTURING COMPANY
Remote Control Equipment—Relays—Thermostats

STERLING SIREN CO.
Electric Sirens

CLARK-COOPER CO.
Air Sirens—Air Whistles

CANNON ELECTRIC DEV. CO.
Hospital Signal Systems—Motor Plugs Receptacles

TRICO FUSE MFG. CO.
Fuses, Oilers, Clip Locks and Fuse Pullers

KNOX PORCELAIN CORP.
Electrical Porcelain

● CHARLES E. FLETCHER, who knew the desert power system of Sierra Pacific Power Co. because he personally built most of it since April 1, 1916, died, aged 53, of pneumonia and heart ailment, June 26. He started with the company as line foreman in 1916 after electrical work for mining companies at Virginia City and previous line construction in Chile and Guatemala. In 1934 he succeeded the late E. D. Brown as general superintendent. He was of that school of practical pioneers who lived the power system he helped to build, day and night.

● CAPT. WILLIAM FRANK GRIMES, U. S.N.R., died at the age of 48 at the Naval hospital at Norco on June 26. An electrical engineering student at University of Southern California in 1917, he went to Naval radio school at Harvard, saw duty in the last war in the Navy and later joined Westinghouse Electric & Mfg. Co. He held a commission of commander of Naval Communications Reserve and Jan. 6, 1941, was called back to active service. On Oct. 8, 1941, he became district communications officer. In 1942 he was promoted to captaincy and in June 1942, awarded honorary degree of Master of Science at U.S.C.

● NORWOOD W. BROCKETT, 64, public relations counsel for Puget Sound Power & Light Co. until his retirement in 1931, died July 18 in Seattle. A resident of Seattle for 44 years, Mr. Brockett was attorney for the Snoqualmie Power Co., predecessor of Puget Sound, joining the organization soon after he moved west from Minnesota. For more than a year, he had been working as a "dollar-a-year" man, promoting sale of War Bonds. He served overseas as a captain of Artillery during the First World War.

● CHARLES C. HILLIS, pioneer electrical wholesaler and manufacturers' agent of San Francisco, died June 26. Mr. Hillis was known in earlier days as the owner and manager of the Electric Appliance Co., wholesale distributor, which was later sold out to the Electric Corp. Of late years he had been agent for the Triangle Conduit Co. for California.

● WILLIAM H. SPAULDING, Pacific Gas and Electric Co. attorney, died last month at his home in Belvedere, Calif., following a heart attack. Mr. Spaulding was attorney and secretary of Great Western Power Co. of California from its inception until its merger with PG and E. in 1930.

TRADE *notes*

Line Material Strengthens Organization in West

Strengthening its organization in the far West, Line Material Co. has appointed the J. E. Redmond Co. as agent at Phoenix, Ariz., and has moved both its northern and southern California offices to enlarged quarters.

Los Angeles headquarters are now at 916 E. Third St., where the company has modern office and warehousing space. Northern California headquarters have been moved from Oakland to San Francisco, with offices at 605 Third St. and warehouse at 625 Third St.

W. Thom Neikirk has been added to the northern California personnel. Neikirk is a graduate of Stanford University in engineering. He was for many years purchasing agent for the City of Palo Alto and has had six years in the electrical contracting field.

Other far West offices of the company are: Portland, 1233 NW 12th Ave.; Seattle, 2216 First Ave.; Spokane, W. 27 Main Ave.; Denver, 2125 Blake St.

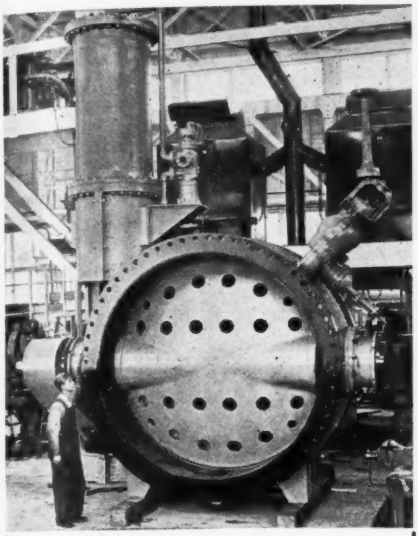
Line Material Co. district managers in the area: P. K. Churchill, California-Arizona-Nevada, headquarters, Los Angeles; C. R. Hazard, Oregon-Washington, headquarters, Portland; W. F. Smith, Utah-Montana-Wyoming-Colorado-Idaho, headquarters, Salt Lake City.

Field engineers are P. E. Brackett, southern California; W. Thom Neikirk, northern California; A. McLaren, Portland; J. H. Warrington, Denver; W. B. Hall is field engineering representative for eastern Washington and the J. E. Redmond Co. for Arizona. M. F. Beisber is West Coast transformer engineer.

● H & H ELECTRIC CO., electrical contractors, Los Angeles, at 1200 E. Sixth, has moved to 2026 Las Encinas at Glendale.

● R. G. HARRIS, Maydwell & Hartzell representative in the Northwest, moved from 1230 NW 12th Ave., Portland, to 1016 First Ave. So., Seattle.

● P & J ELECTRIC CO., Adolph E. Holmsten, proprietor, contractors of San Francisco, moved from 651 Broderick to 531 Baker St.



Control valve for Pacific Gas and Electric Co.'s Pit No. 5 power house, one of four butterfly valves now being manufactured by Joshua Hendy Iron Works

● LEMERY-DENISON ELECTRIC, LTD., with paid up capital of $20,000 has been incorporated in British Columbia as an extra provincial company. Head offices of the firm are Saskatoon, Sask., with B. C. offices at 1147 Howe St., Vancouver. The firm is engaged in the wholesale automotive and electrical parts business.

● INDUSTRIAL ELECTRIC CO. purchased a new and larger building directly across the street from its former address at 1276 Denny, Seattle. L. J. Benedetti, its proprietor, announced that the office, warehouse and shop of the company would now be located there.

● ACCURATE APPLIANCE CO., formerly at 408 Hayes St., San Francisco, has moved to 903 O'Farrell St., where larger facilities for appliance repair work as well as display space when appliances are again available are provided, according to Al Hale, owner.

● JOSEPH BRADY, graduate of the Northern California Electrical Bureau appliance repair class, has opened his own repair shop at 1428 Haight St., San Francisco.

● ROMAINE W. MYERS, consulting electrical engineer, moved from a long-time location in the Federal Building, Oakland, to 475 12th St.

● ELECTRIC AGENCIES has moved from 2059 Webster St., Oakland, to 1630 Webster.

CY INC. CONDON & YOUNG, INC.
357 SOUTH HILL ST., LOS ANGELES, CALIF.

LAPP LINE POSTS and STATION POSTS are the modern-appearing, modern-performing high-voltage insulators. Serve without cleaning in areas of most severe atmospheric contamination. Radio free. Puncture proof. Superior to all other designs in ability to withstand power arcover, stones and bullets.

Condon & Young represents: UNITED STATES RUBBER CO. Wire and Cable Division
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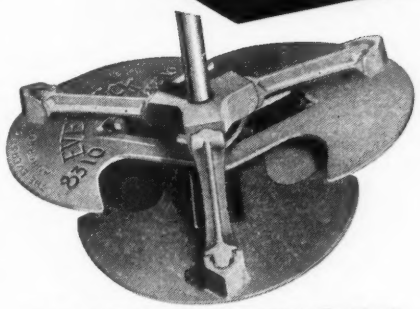
First CHOICE IN ANCHORS



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For dependable anchoring under all conditions, use Eversticks. Made of tough, rust-resistant, malleable iron . . . quick and easy to install . . . expand in undisturbed earth. Preferred by engineers and crews alike.

Write for latest Everstick bulletin.

EVERSTICK ANCHOR CO.
FAIRFIELD, IOWA

NON-STOP PRODUCTION with

TRICO OILERS

No need to stop production to oil machines — no bearing failures due to lack of oil—no waste. Modernize your machines and conserve critical materials, manpower, and increase production. INSTALL TRICO AUTOMATIC OILERS!

TRICO KLIPLOKS

That jack-screw pressure literally bolts fuses and clips together!

KLIPLOKS ELIMINATE:

- Unnecessary shut-downs.
- Premature fuse blowings.
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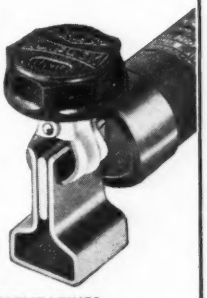
- Burnt fuses and clips.
- Wasted current.



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Albert S. Knight, 3006 Western Ave., Seattle
Pacific Industrial Products Co.
9th & Harrison Sts., Oakland, California

TRICO FUSE MFG. CO., Milwaukee, Wis.

Member A.I.E.E
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G.C.A.
Lamp Replacers
Lamp Base Removers
Cartridge Fuse Tongs
Switch Hooks
Send for Catalogue
We have been making safety tools for 26 years
THE G. C. A. Manufacturing Co.
Pittsfield, Mass.

Pictured at General Cable Corp.'s Emeryville plant with "M" pennant: Left to right (front): Dorothy King, Dwight R. G. Palmer, Jeanne Bateson, Carl Flesher, Walter Griswold; (back) M. Boro, L. W. Klossner, Wm. Lendon

General Cable Awarded Maritime "M" at Emeryville

Dwight R. G. Palmer, president of General Cable Corp., and a group of company notables came to Emeryville, Calif. to add their tribute to the workers in the company's Emeryville and Los Angeles plants when the Maritime "M" award for excellence in war production was presented to the employees there, July 17. Beside President Palmer there were present J. R. MacDonald, vice-president; P. D. Rensenhouse, vice-president and treasurer and J. C. De Long, director of advertising for the corporation from New York City.

Attending from the Pacific Coast were James Crilly, Pacific district manager; J. C. Pyle, Los Angeles branch manager and James Fletcher, recently appointed Seattle branch manager; Walter Griswold, Emeryville plant manager; and L. W. Klossner, Los Angeles branch manager.

Receiving the award for the employees were Dorothy King, Emeryville and Jeanne Bateson, Los Angeles; Martin Boro, Emeryville and William Lendon, Los Angeles. The presentation was made by Carl Flesher, regional director, U. S. Maritime Commission. A similar presentation was made to the corporation at its Bayonne, N. J. plant for the eastern plants, the one at Emeryville for the two western plants.

SALES MANAGER

Salary $10,000 to $15,000 per year. Position permanent. Necessary experience to qualify requires sales and engineering training plus executive experience. Age 40 to 49. All replies will be held strictly confidential. Write Box 76, Electrical West, 68 Post Street, San Francisco, Calif.

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SAN FRANCISCO
235-241 San Bruno Ave.
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SEATTLE
2122 Fourth Ave.

By
ANGUS-CAMPBELL, INC.

Bristol Co. Announces Personnel Changes

Bristol Co., manufacturers of automatic control and recording instruments, has announced personnel changes affecting its Pacific Coast district.

J. W. Peckham, who had been Pacific Coast manager, has been appointed manager of the development and design engineering department with headquarters at the home office in Waterbury, Conn. E. Nuber succeeds him as manager of the company offices in Seattle, San Francisco and Los Angeles and of the San Francisco branch factory. He will make his headquarters in San Francisco.

Nuber was previously with the New York Edison Co. and joined Bristol Co. in 1929. He has represented Bristol in a number of cities, including Los Angeles, Boston and Chicago.

● GEORGE WHITE has been appointed manager of the general appliance department of the Hudson's Bay Co. store at Vancouver, B. C. White was formerly general manager of the Nanaimo branch of the company, which specializes in electrical appliances and furniture. E. R. THOMPSON, who for the past 10 years has been with the branch of the Vancouver Hudson's Bay Co. has been placed in charge of the Nanaimo store.

● CALIFORNIA ELECTRIC SERVICE STATIONS have outgrown their Los Angeles shop, according to Clyde L. Chamblin, and will move from 630 W. Ninth street, to 1518 W. Seventh, Los Angeles, about Oct. 1. The new shop will be much larger and attractively arranged. It is in charge of Keith Chamblin, who started the service station in that city.

● EARL WILSON, pioneer electrical contractor and dealer of Napa, Calif. has announced his retirement from the business. The radio shop, only remaining shop of his large business, is to be taken over by Jack Baldock who has been operating this department.

● HYCAR CHEMICAL CO., Akron, Ohio, producer of butadiene synthetic rubber, has established West Coast warehouse facilities at 1248 Wholesale St., Los Angeles, it has been announced by Frank M. Andrews, general sales manager.

● F. J. AIREY CO., 1855 Industrial St., Los Angeles, has been appointed representative of the Kurt Versen Co. of Union City, N. J., for its commercial line of indirect fixtures using bowl-silvered lamps.

Putting 'em Thru the Mill!

Strip for Action! Strip made from WILBUR B. DRIVER CO. special alloys! Strip that has so many essential war uses! As it is rolled through their mills, day and night, we know it will do its part in flattening the Axis!

Consult us for your special alloy requirements in rod, wire, ribbon and strip—both hot and cold rolled.

ELECTRICAL SPECIALTY COMPANY

Pacific Coast Representative

LOS ANGELES 418 East 3rd St. | SAN FRANCISCO 316—11th St. | SEATTLE 562 First Ave., So.

"WHAT CAN IT DO FOR ME?"

Advertising that is read with this thought in mind may provide the solution to a problem that has kept you awake nights.

We all know "It Pays To Advertise." It pays just as big to investigate WHAT IS ADVERTISED—every month in

ELECTRICAL WEST

TORK CLOCKS

THE POPULAR TIME SWITCH LINE KNOWN EVERYWHERE

NOW—lower prices and higher capacities

There is a Tork Clock for every regular switching job: 60 minute, 4 hour or daily cycles.

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Geo. H. Curtiss, 540 McAllister St., S. F.
H. M. Sayers, 1101 Eastlake Ave., Seattle
Stevens Sales Co. 41 P.O. Place, Salt Lake City
Felix Simon, P. O. Box 614 . . . . Denver
H. Geo. Shefler, P. O. Box 1587 . . . Phoenix

HELWIG COMPANY

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Carbon Products

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Multiflex Brushes
Give Better
Commutation,
Longer Life,
Less Commutator Wear,
That Extra Demand Required,
Better Performance
All Around

Pacific Coast Offices

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Oakland, California

166 Jackson Street
Seattle, Washington

324 N. W. Broadway
Portland, Oregon

225 W. Pico Boulevard
Los Angeles, California

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PROFILES *of the month*

Westinghouse is utilizing roll film and three-dimensional viewers as a sales tool to present technical details of electric installations and equipment. At left, Roy Marcellus, head of the Western-Knapp Co. engineering department, San Francisco, looks over some of this film with Howard Brown (right) Westinghouse Supply Co. application engineer, San Francisco

Below: R. S. Quick, general manager of Pelton Water Wheel Co., and C. G. Crawford, company sales manager, examine old and new models of the water wheel bucket. At left is first bucket of 1880, with central dividing splitter; others, 1915 and 1943 models

Edith Rauch, Puget Sound Power & Light, second winner in McCall award

Shown with her staff is Miriam Jackson Emery (right) director of the Hawaiian Electric Co. home service department, and winner of the 1942 McCall Award in the field of nutrition. Others pictured are Yuki Sugai, Esther Corbaley, Erma Meeks. Hawaiian Electric Co. was given first prize in the competition on the basis of outstanding service in helping to meet problems araising out of the bombing of Pearl Harbor. Second prize went to Puget Sound Power & Light Co. for its contribution to the war effort through cooperation with the government in furthering an understanding of the importance of proper nutrition

YOUR appliance repair dealer is an important man to know these days. He tries to keep as many replacement parts on hand as priorities, allotments, etc., will allow him. He has studied appliance repair, equipped his shop with the parts and repair tools needed to keep your home appliances operating efficiently for the duration.

Just think now! What on earth would you do if your heating system quit cold ... if your washing machine stopped work in the middle of a washing ... if your vacuum cleaner decided it was through working for you ... if your refrigerator got temperamental?

Any one of these happenings would give you a bad day. But fortunately you can do two things about it.

First, *you can help avoid such annoyances by proper care and use of appliances.* Use them without abusing them. Keep them cleaned up regularly for more efficient operation. Keep them oiled according to instructions.

Second, *when appliances go dead, call the "specialist in repair."* He is your authorized repair dealer. Each office of this company has a list of these men. Call your local P.G. and E. office when one of your home appliances breaks down and you don't know where to have it repaired.

Duration-ize your appliances with timely repair!

P·G·and E·

PACIFIC GAS AND ELECTRIC COMPANY

COPY FROM A P.G. and E. ADVERTISEMENT RUNNING CURRENTLY IN 312 NORTHERN AND CENTRAL CALIFORNIA NEWSPAPERS

Adequate Wiring is Important!

The modern war plant is almost 100% electrical. Heating, treating, machining, assembly... the heaviest operations as well as the most intricate... all require electricity. Wiring is so modern it includes control-devices and other features the public has never even seen.

Tomorrow's *homes* will have the same sort of "engineered" wiring. Plenty of well-located outlets, waist-high outlets for the vacuum, furnace controls by the bedside and many other practical innovations already have a large degree of acceptance. With ideas picked up during the present lull in building, there should be even greater interest once peace comes and building resumes. Don't miss a single opportunity to get in *your* "two-bits' worth" for Adequate Wiring. If you need ammunition, don't hesitate to call either of our offices

PACIFIC COAST ELECTRICAL ASSOCIATION

601 WEST 5TH STREET, LOS ANGELES • 447 SUTTER STREET, SAN FRANCISCO